

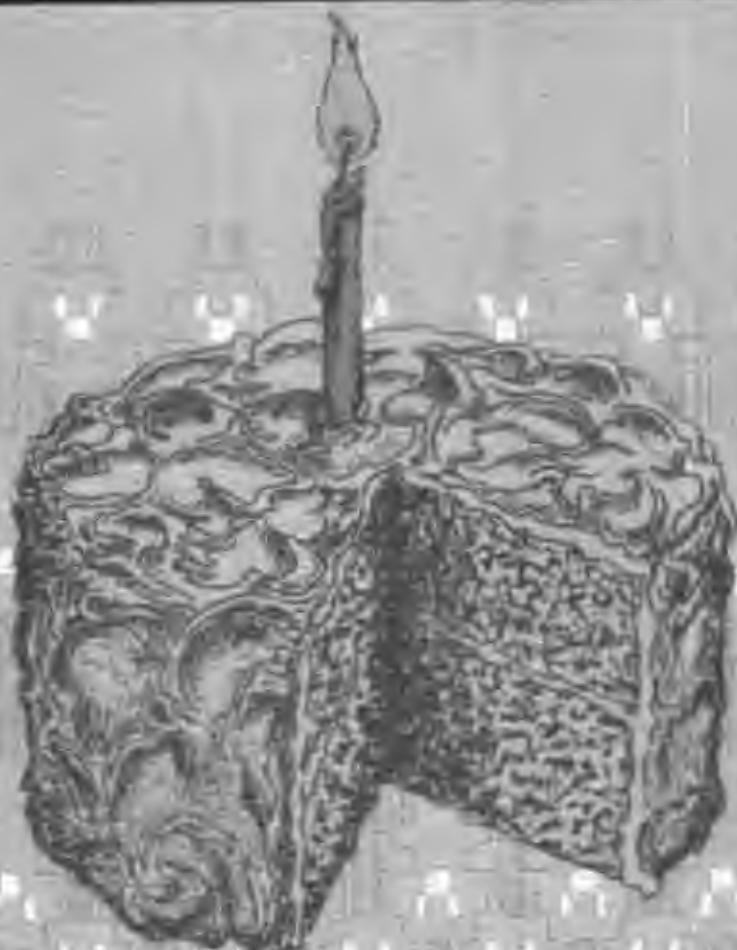
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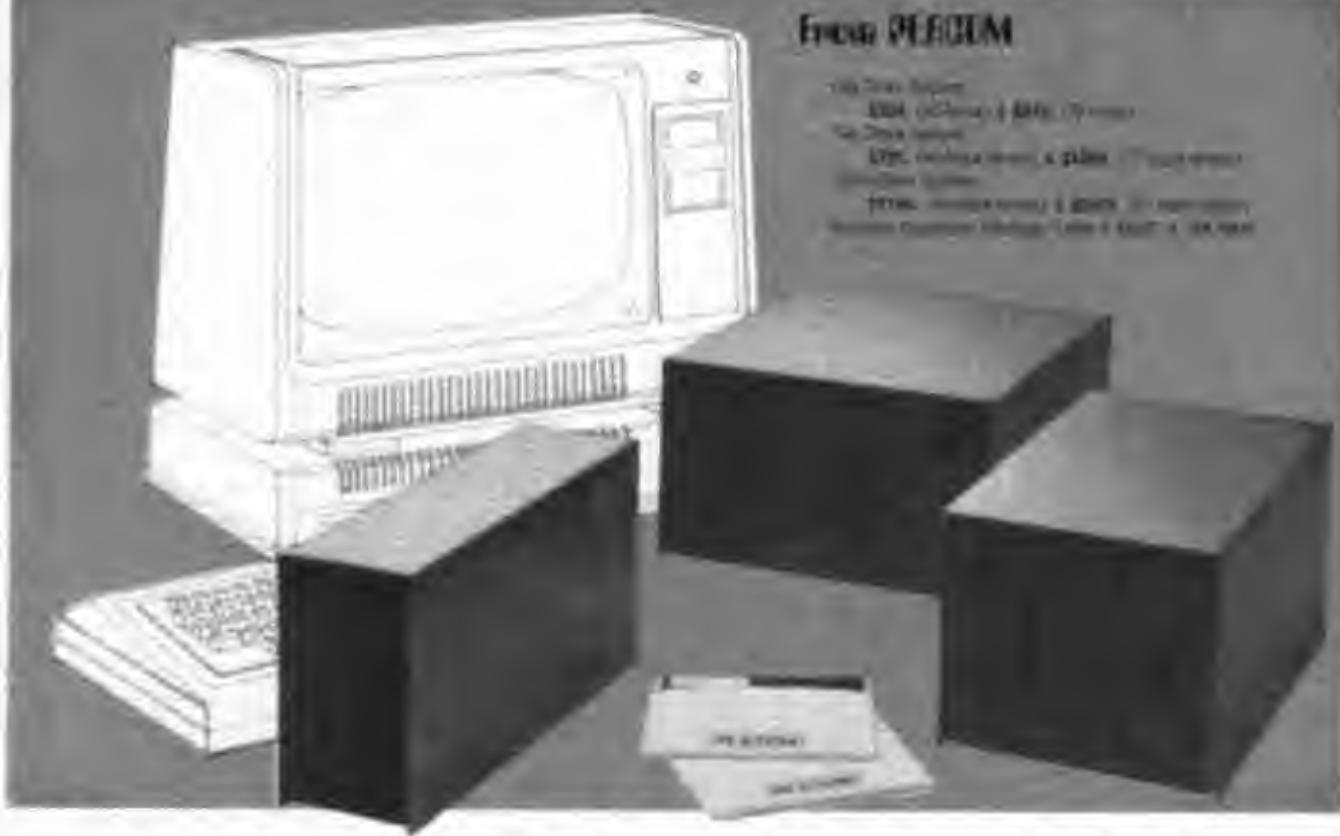
The TRS-80 Users Journal

Volume II, Number 6

Sept/Oct 1979



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* SOFTWARE *

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Requires 16K Level II

SFR-51180360T \$10.00

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SFR-52551001T \$24.95

MACHINE LANGUAGE UTILITY PACKAGE-2

By Discus-Tech

[Line Handler Handler] Contains an extremely flexible line processor module, including commands for line-at-time, setting lines per page and automatic paging, and the option of a tractor-feed or friction-feed mode. MLUP-2 also contains the keyboard handler described in MLUP-1, with a keyboard command which will execute a log-of lines.

SFR-52551002T \$24.95

MACHINE LANGUAGE UTILITY PACKAGE-3

By Discus-Tech

[Editing Package] A line-renumbering program which can move and/or renumber blocks of code. MLUP-3 can remember a program, keeping existing increments between line numbers or renumbering them. It also provides a combine function which removes all remarks and codes from a BASIC program.

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* SOFTWARE *

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By FMG Corporation

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This implementation of CP/M contains the usual CP/M commands such as: DIR, ERA, TYPE, SAVE, REM, BYSGEN, STAT, PUT, AIM, LOAD, DOT, and SUBMIT.

For those not familiar with CP/M, the set of 5 CP/M manuals is available for only \$25.00.

SFR-52770080M \$150.00
CP/M Manuals (set of 5)
SFC-52961087D \$25.00

RSM-15

By Small Systems Software

A Monitor with a Built-in Disassembler. All of 8080-1 plus a Zilog command to display memory in Zilog symbolic code (A, Z80 Disassembler). Computes all relative addresses and displays both object codes and mnemonics. Runs in 4K. SFR-52321028T \$125.00

MICROCHESS

By Small Systems Software

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AIR-RAID

By Small Systems Software

A Real-Time TRS-80 Shooting Game. Air Raid is an arcade type game that takes full advantage of the TRS-80 machine language capabilities. Large and small airplanes fly across the screen at different altitudes. A ground based missile launcher is pointed and fired from the keyboard. Aircraft explode dramatically when hit, sometimes destroying other nearby planes. Score is tallied for each hit or miss, and the highest score is saved to be challenged by other players. Air Raid will provide hours of fun for you, and is a super demonstration program. Runs in 4K. SFR-35301040T \$19.95

FORMATTED SCREEN INPUT ROUTINE

By Discus-Tech

This utility program provides "log system" features for the TRS-80. It sets up a screen of input fields. The user can input to-and-change items at random, and it provides a comprehensive error-checking function.

SFR-52851004T \$24.95

Editorial Remarks

DIGITAL DIGESTER? COMPOST COMPUTER? Don't laugh - with gasoline at \$1.00 per gallon (when you can get it), this may not be such a bad idea.

Fact is, there is more gas around than most of us know about - and that gas is methane. Methane is the gas which escapes from a compost heap sometimes called "swamp gas".

Methane can be produced by composting leaves, twigs, lawn clippings, potato peels, manure and almost any other (if not all) organic materials. In other words, it can be made from garbage.

One of the neat things about it is that after the anaerobic action has taken place, the garbage no longer has the smell of garbage. The gas can be collected and used, and the residue is almost pure nitrogenated fertilizer, which can then be used to grow more material for human consumption and at the same time creates more material for the composter!

At the same time, we can make gas, and clean up the environment! Sure, there are a couple of "gotchas" which come with it. Methane does not have the energy Butane has. Trying to compress it into a form to be carried with a vehicle probably costs more than you get out of it. But at today's gas prices and shortage, it may be realistic to try.

It is a fact that Methane will run an internal combustion engine - it has been done. Gas engines require 18 cubic feet of Methane per horsepower per hour, which is quite a bit to try and carry along.

In a gas crunch though, one could use Methane in some of the more stationary applications, freeing up the gas now being used, for transportation. Methane can be used for heating and cooking, just like Butane or Propane, only it is somewhat less efficient. But who cares about efficiency if it is almost free? Aside from that, it now could give you a place to dump your lawn clippings and other garbage.

But what has this to do with your computer? A whole lot, if you use some imagination. How about using the computer as a process controller? With HSG232 input and output you can sense temperature, pressure and pH balance. Then, based on these inputs, it can output control functions to correct for variations.

A digester is nothing more than a tank, into which a slurry (garbage mixed with water) is poured. Anaerobes (a microorganism which lives and grows without

80-U.S.

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There is no free oxygen in trash down the slurry, producing the gas and leaving a high quality, colorless fertilizer. For most efficient operation, the tank should be held at some even temperature. The slurry should also be maintained at a given pH balance.

What can you get from this? An ideal fuel, easy to get, it deposits far less crud in an engine than gasoline, and exhausts a relatively low amount of pollutants into the air when it burns.

If you find an interest in this you can find much more in a book published by The Mother Earth News. It is called "Handbook of Homemade Power", a Bantam Book, 1974. Who knows, BS may finally become a valuable commodity! Mike

80-U.S.

THE JOURNAL FOR TRS80 Users



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LETTERS



Dear Mike

80-US is now my hands-down favorite of all the TRS-80 magazines. You asked "what is an android?" As a science fiction reader from way back, here are my definitions:

ANDROID: An artificially created but living being that looks exactly like a human and grows from an embryo in a manner identical to a human. The difference is that the android was originally "conceived" from a mixture of chemicals instead of sperm and egg, and is incapable of reproduction.

CYBORG: Human being who has had portions of his body replaced by artificial organs or limbs (like the E Million Dollar Man).

ROBOT: Totally artificial, non-living creation which may or may not resemble a human.

Louise H Frankenberg
Pasadena, MD

Dear Sir

Your publication is a fantastic help for us non-computer minded people. The program tips and listings have greatly increased my enjoyment of my TRS-80. To help you with your question on the differences between cyborgs, robots and androids I offer the following. CYBORG obviously refers to the science of cybernetics - the comparative study of the brain-nervous systems and electrical-mechanical systems. Various science-fiction writers have assumed that in the future, a being based on these studies would be a "far accomplishment" and dubbed it a cyborg.

An ANDROID, according to the 1751 original usage is "an automation resembling a human being". The original product of Isaac Asimov's US Robotics and Mechanical Men was an android for home use. The problems encountered by this being in relations with humans led to the company being forbidden to sell its product on earth. This in turn, led to the development of more specialized

devices for use on other worlds. (I highly recommend your perusal of Asimov's "I, Robot")

Finally, the often referred to play R.U.R. (Rossum's Universal Robots) by Karel Capek of Czechoslovakia, written in 1923 was the origin of the popular term Robot. The somewhat refined definition (circa 1925) is a "machine devised to function in place of a living agent; one which acts automatically or with a minimum of external impulse". The machines on Mars, the Moon and other worlds envisioned by Bradbury, Asimov and others genetically were totally functional devices which did not resemble human form; therefore, they were robots. Of course, Star Wars popularized the affectionate term "Droids" (short for androids) which was the correct term for C3PO but not for R2-D2!

As you suggested, these definitions were not found in Funk and Wagnalls.

David B Kimball
Fayetteville, NC

(Seems our questions about androids raised considerable interest and response. See also the verse by Pandora Key, which we thought was worthy of a page by itself - *Now, what would you call a party doll with an RS 232 interface?* Ed)

Dear Sir

May I first congratulate you on a well presented and informative magazine, also on your prompt response to correspondence - a rare thing these days.

I am an amateur and beginner at programming, but have learned up to Level II Basic on my TRS-80. I am finding the jump to machine language too great to comprehend. Would you be kind enough to answer the following short questions: Do you know of a book on machine language for beginners? Is

there a program available which will allow one to use lower case and display it on the video? Is there a program which will allow one to renumber a program (line numbers)? How does one read (load) a program which is entered in the TRS-80 in machine language via the System Command?

Dr John Castle
Phympston, Australia

(TRS-80 Assembly Language Programming - Radio Shack 62-2006 by William Borden Jr. \$3.95 is one of the best books we have seen for beginners in machine language programming. Also our own column "View from the Top of the Stack" by T Rosenbaum should help you in that direction.

There are several lower case mods, requiring both hardware and software, which will display lower case on the video and output it as well. See 80-US Jul-Aug 79 for one which will not display lower case on the video but will output uppercase case to the printer. If it is not possible to display lower case on the video without hardware modification.

There are many renumber programs available. Radio Shack and the TRS-80 Software Exchange 17 Brier Cliff Drive Milford, NH 03062, just to name two.

You cannot list a program entered via System Command in the same way you would a basic program. You can only look at the code in memory, using T-BUG or another monitor. Ed)

Gorchtein

My "Snake Egg" cassette arrived today. I would definitely recommend this program for all "kiddies" age 3 to 83. The Sound portion is great. Wish there were more musical notes though. I already have the original "Android Nim" but after the Snake Egg game, I have sent for the latest Android with sound. Leo must have put many hours into these. The Level II Poke Graphics by Geo Blank was also great. Keep up the great



Andy

DEAR EDITOR;
 WHAT IS AN ANDROID? WHAT CAN IT BE?
 WHAT HAS CHRISTOPHERSON GIVEN TO ME?
 THE FORMATION IS LATIN (ANDROID IT SEEMS)
 FROM TWO GREEK WORDS... HERE'S WHAT IT MEANS.
 AN AUTOMATION ASSEMBLING A HUMAN BEING
 MAN PLUS LIKE: (SEE -DID FOR AGGRESSIVE)
 THE USAGE IS RARE (BEFORE BASIC MEDIA)
 WITH REFERENCE TO CHAMBERS CYCLOPEDIA.
 ALBERTUS MAGNUS, IT SEEMS, IS RECORDED
 AS HAVING A FAMOUS ONE. (NO NAME IS RECORDED).
 THE RAMTOLIA LISTS IN ADCCCXIX
 THAT SOMEONE BY THE NAME OF XENOPOLY,
 CONSTRUCTED AN ANDROID THAT COULD PLAY (NESS)
 IN VIEW OF THE YEAR, AN ACCOMPLISHMENT, NO LESS.
 OUR ANDROID IS HIM. WHO? WHO WAS HE?
 HE'S OUR BABYSITTER, OUR PLAYMATE. HE'S SPECIAL TO ME.
 MY BIG OXFORD ENGLISH SAYS HE'S A THIEF!
 TO DEAL OUT, TO HOLD, POSSESS, OCCUPY. GOOD GRIEF!
 AN ARCHAIC, TEUTONIC BUT COMMON WORD.
 REAPPEARED IN XVII TH CENTURY AS A SLANG WORD.
 ANDROID HIM ACTS UNCLE, FOR WHEN TAKEN GRANT.
 HE'S A HUMAN AUTOMATION. BEST WISHES,
 WHO HAS STOLEN MY HEART. PANDORA KEY
 (CONCORD, VA.)

publication.

Andy Brewer
Knoxville, TN

(Sure wish you would tell Wayne Green that! In the July 79 issue of *Kitschbaut Microcomputing - Publisher's Remarks*, he called Snake Egg a "simple-minded game" and "a game of no consequence" and that without the graphics it would have "been a drag". He also said that people are no longer paying \$15 for game programs. What do you think? Ed)

output and input. Do you have any other possible solutions? Further, Level I allows input of mixed numbers. For example, 13 feet 2 and 1/2 inches may be entered as $13 + 2.5/12$. This is very convenient and is not allowed in Level II. You can use the following, although then an "inch" dimension must be input each time including zero.

```
100 INPUT "LENGTH (FT.INCHES)"; F
110 GOSUB 1000
120 PRINT "LENGTH is "; F; " FEET"
130 END
1000 F = F + 1/12: RETURN
```

Robert A Hood
Bremerton, WA

(Dear anyone? Ed)

Sirs

For those users of KBFIX, I've found a simpler way to get it into the TRS-80.

1. Load KBFIX as usual.
2. Load TBUG (or some monitor).
3. Punch a tape using the start address of KBFIX as the execution address and the end of memory as the end address. For example, on my 48K system KBFIX starts at FF08. Here are the start addresses for various sized systems:

4K - 4FF8
16K - 7FF8
32K - BFF8
48K - FFF8

Once the new tape is made, load KBFIX as usual, except you will find the new tape loads in two blinks of the star. Another thing I've done which I find useful is relocate T-BUG to reside in high memory just in front of KBFIX. By punching a tape as above I now have both T-BUG and KBFIX resident in memory. In order to be able to call T-BUG from Basic, once T-BUG is loaded modify locations 408E and 408F to contain 70 F8 (T-BUG's new location). To enter Basic from T-BUG perform J 1A19. To enter T-BUG from Basic use USR0. This works so slick I've been thinking of modifying T-BUG so it will change 408E and 408F automatically. (How lazy can you get?)

Hal Davis
Portland, OR

(It's not lazy Hal, the computer is supposed to be YOUR slave, not the other way around. Ed)

Dear Mike

The note on the INKEYS function in the May-Jun issue neglected to mention one very important point. The TRS-80 keyboard remains active during the execution of any basic program. The value of any key struck while a program is executing is stored and recognized by the interpreter as INKEYS, whether it is

used or not.

But what is important is that if a program contains a line which tests INKEYS for some value, an unintentional keyboard strike will result in an apparent program failure. To demonstrate, run the following program and strike any key while the delay loop is running.

```
10 FOR I = 0 TO 1000: NEXT
20 AS = INKEYS
30 PRINT AS
```

Since the function INKEYS loses its value and returns to null after it is tested, a solution to the above dilemma would be to change line 20 to read:

```
20 AS = INKEY$ : AS = INKEYS
```

I enjoy the JOURNAL, especially when it contains such goodies as your "String Packing" and Tom's View from the Top of the Stack.

R E Douglas
Clearwater, FL

80-US

I have a solution for the problem presented in LETTERS (80-US May-Jun 79). The character set utilized by the TRS-80 Line Printer can be changed by contacting Centronics and requesting a different chip. The (cannibalized) card can be replaced with a (normal zero) by ordering Part # 355-12027-1150. This part costs \$62.00. It can be installed by most anyone, however Centronics is reluctant to sell it directly to customers. They prefer that you buy it from their local sales office and have it installed by an authorized service person. Their customer relations department phone is (803) 883-0111. I do not know all of the various character sets available, but do know that the part mentioned above is available.

Terry A Beadle
Warren, MI

(That was one to take the slash out of the zero, now here is another. But it helps how to put it in? Ed)

If you are looking for something to fill those little nicks and crannies in your typesetting, how about publishing your readers' unusual license plates? There are a lot of computer oriented license plates around. As an afterthought, why don't you have someone put a slash thru the zero on the type ball on your selective so you can print cancelled zeros like the TRS-80 does? They are made of soft white metal and this could be easily done by any machine shop that does injection mold work. They could cut a narrow groove thru the zero and insert a strip of wire that could be sprung in place. If you nail the type ball, they are cheap to replace.

Jim Ramsey
Las Vegas, NV

adventure

by Scott Adams

Inspired by its namesake on larger computers, these programs are not mastered in an hour. Interest is maintained as you wander through your Adventure using commands in English like "KILL Dragon." Games in progress can be saved to cassette (or disk). Already a classic in the Star Trek and Space War tradition. Three different adventures for 38k, Level II:

Adventureland	\$14.95
Pirates Adventure	\$14.95
Mission Impossible Adventure	\$14.95
Special diskette with all three	\$39.95

invasion orion

free automated simulations

The new solitaire version of the popular tactical wargame, Starfleet Orion. Of the Tatar, **80-US** stated that "the game is challenging and complex, and there are so many variations that it can be fun for a long time." Invasion has various scenarios for challenging players of different skills in space warfare. Includes listing, cassette and battle manual.

38k, Level II \$19.95

Starfleet Orion also available for \$18.95



blockade

From Personal Software by Anderson

Action, machine language, arcade game for two players. Sound effects with an 8:8 ratio. Try to beat your opponent in a flat or spherical course using one of ten different speeds.

48k, Level I and II \$14.95



morse

From Discovery Bay by Pilgrim

New learn Morse code with this practice and tutorial program. Using the AUX output, the program sends code. Six lessons from a beginner's introduction to 25 wpm speed drills. Mastering of code is more rapid than auto-instruction tapes.

38k, Level II \$14.95



bandito

From Adam Software by Preussler

Take a gamble. Pull the arm on this graphic slot machine program with sound effects.

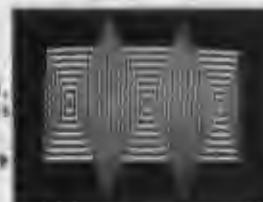
38k, Level II \$9.95

electric paintbrush

From Personal Software by Anderson

New graphic language for use on your TRS-80. Written in machine language, artistic displays were never easier or more dramatic.

48k, Level I and II \$14.95



santa doravio

Free Instant Software by Stens

As ruler of a medieval city-state you struggle to create a kingdom. Up to six players compete to become King or Queen.

38k, Level II \$7.95



space odyssey

From Creative Computing Software

Four quality programs including the classics of Ultra Trek and Star Wars plus a new one called Romulan. The fourth, Star Lakes, is a multiple player, barter and trading game.

38k, Level II \$7.95

market

From 101 by Dick Almworth

The excitement of Wall Street. From one to nine players invest in the stocks of varying quality. Program plots stock performance and M.P.E.

Level II version allows setting short.

38k, Level II \$14.95



ATERM

From Adam Software by Stilett

The ASCII terminal program with the features you need and want: truly full duplex, completely compatible with Radio Shack's RS-232, feed to line printer feature, all 128 ASCII characters from keyboard, support of lower-case if modification made, and BELL sound on AOL line from computer. You set baud rate, parity, word length, and number of stop bits received. More features than similar program setting for more than twice the price. 38k, Level II with modem \$19.95

SYSTEM SAVERS

From Adam Software by Stilett

If you ever use the SYSTEM command you can use this too. In program package, WITH FILE, you can make copies of your own SYSTEM Format Tapes, or use it to make backup copies of any hard to load tapes. It can also identify the file name of any system tape. TDISK will move any SYSTEM tape onto disk. Utilize similar program. It will work with non-contiguous tape formats. TDISK instructions show how to load Microchess 1.5 onto disk.

38k, Level II \$14.95

NUMBERING

From Adam Software by Stilett

Renumbering, merging and editing of BASIC programs. In either Level II or 38k you select whether you want the whole program renumbered or only a section. Also, load multiple BASIC programs with the merge feature. THIS allows you to create a "menu" of programs. Accidentally REMED programs or programs lost by DOS reformatting are often recoverable using the fix capability. And these features can be accessed from BASIC using the NAME command!

At last! Here is version, instant write up. "I can't imagine anyone being without it. This is a must for everyone."

The 38k, 256 and 48k versions all on the same tape. \$14.95

COMPUTER CABLEVISION, INC.
2617 42nd ST NW WASHINGTON DC 20007

YES, please send me

NAME _____

PHONE _____



POSTAGE _____
TOTAL: _____

NAME: _____

ADDRESS: _____
CITY, STATE: _____
ZIP CODE: _____

- Check payable to COMPUTER CABLEVISION, INC.
 Mastercharge accts bank check
 VISA card number: _____ exp date: _____
Signature: _____

RANDOM ACCESS



Last issue we sort of garbled the type on a product announcement for the CPU Shop. Now we will just have to keep doing it until we get it right!

МІСІЯ ПІДПРОГРАМ

THE CPU SHOP, 39 Pleasant St., Charleston, MA 02129 has a utility program called "KVP" written by Lance Micklus which runs under DOS or L2 Basic. Among other things, it allows you to use an external keyboard, eliminate keybounce (the amount of correction is adjustable), display upper and lower case on your screen, and exchange programs written in Basic with other computers. Write, or call 617 242-3350 for more information on this.

CAUTION - GTR-00 RECORDER

From a G2 Technical Bulletin, given us by Dick Bazzedo, Seattle, WA, comes the following:

Potential damage to TRS-80 Level II BASIC tape while loading with CTR-80 Recorder. After receiving a number of calls reporting difficulty in loading IQ2 Level III BASIC, our investigations revealed that in over 80% of the instances, the user was employing a RadioShack CTR-80 recorder. Our technical staff has determined that using this recorder can permanently damage the tape, during a unique set of circumstances.

The problem occurs when the smallest grey plug of the TRS-80 is inserted into the "MIC" jack on the recorder. This motor drive connection allows the computer to turn the recorder on/off. If for any reason during the reading of a tape the computer shuts off the recorder, a "spike" can be recorded on the tape. This spike permanently damages the Level II BASIC tape and makes it unusable.

Several days of testing has confirmed that this damage is caused in every instance when the computer shuts off the recorder motor. As of this date the only recorder known to cause this problem is the CTR-20.

RECOMMENDATION: G2 is recommending that the smallest grey plug of the TRS-80 NOT be connected to the CTR-80 recorder. This will eliminate the possibility of permanent damage of the Level III BASIC tape. We recommend that the precaution outlined above be exercised with ALL TAPES when using the CTR-80 recorder. Damage can result whether the tapes are G2 or any other software, including your own saved tapes.

CANADIAN REGISTRATION FOR MD-HS

MICROMATIC SYSTEMS Inc #101 8130 Park Road, Richmond, BC Canada V6YH-171 - has become the Canadian distributor for the JOURNAL. Effective 1 September 1979, all Canadian subscriptions will be handled by Micromatic Systems and Terry Baker expects to have most 80-US Software available at that time. Terry's phone number is (604) 220-1532.

RADIO SHACK JUMPER CHANGE

The jumper code for the two dip shunt jumpers in the Radio Shack computer has been changed for units which use the new two-chip Level II ROM. These ROMs plug directly into the old Level I sockets rather than being mounted on an external circuit board. The external circuit board is not used in this configuration. The top shunt on Z3 is now open. All other shunts on Z3 are in place. Z71 is unchanged. This information was received from Jim Simpson, Box 632, West Caldwell, NJ 07046 who is buying used TRS-80s and peripherals for use by handicapped children. He will give an immediate quote upon your description. (201) 226-9185 or (201) 342-3110 evenings only.

NO BELLY-BUTTONS

Bill Pitt, of the MBUG News answered our question (reference "What is an Android?") by saying that everyone knows that the only outward difference between humans & androids is that an android looks a model.

RENEW YOUR SUBSCRIPTION NOW!

One of the problems of being around for a whole year is re-subscriptions. How do you best handle this item? Well, we thought about it long and hard (one afternoon) and came up with the most ingenious plan (borrowed from the IRS). We figured the IRS cared us something. After all we are doing for them! THE PLAN is to use a double mailing label, one that pulls off and can be stuck somewhere else, and not there! The next step in the PLAN is to find the hard center-fold in this issue, then find the right card, and then STICK IT ON! There is a card for U.S., one for Canadian, one for ordering software and yet another for asking any one mentioned in this issue for more information. But, how do you know when your subscription is up? Well, we have devised yet another plan which puts a three character code on the upper right of your mail label like PB9 or P30 or H50. Disregard the first character - it is the Editors way of keeping track for accounting purposes.

If the last two characters are	your leaf issue is
B9	Sep-Oct 79
10	Nov-Dec 79
39	Jan-Feb 80
50	Mar-Apr 80
70	May-Jun 80
90	Jul-Aug 80
20	Sep-Oct 80

Notice how cleverly we used H&E so that November would not be two digits? Now that you know how it works, how about trying it. And by the way, please don't get all over us for using those big cards which probably won't fit into a normal envelope. Effective 15 July 79 the good old Post Office decided the minimum size of mail, so the cards were designed to squeak in just over the minimum.

MAKE A NICE DAY! And tell them you saw it in the JOURNAL!

The following "Advertisement" appeared in the June 1979 issue of the Orange County TRS-80 Users Group newsletter. I called Bill Barren, just to make sure these "values" were real, and got his permission to reprint this "Ad". These deals are too good to pass up!

THE GAME OF NUMB

A Great new game for all you game phreaks! The TRS-80 battles 1 to 3 players in divvying up a pile of 2 counters. Great graphics - Color Screen, Etc
\$37.95 Level I cassette
\$47.95 Level II cassette
Disk version in process.

KEYBD-I

New from Radio Shack! Can be added to Level I systems to create keyboard bounce Level 1 users! DON'T BE LEFT OUT! Order now \$19.95 cassette

STARRY EYES TWO

A super space game! You battle Klingons, Protestants, and Lion People with photon torpedoes, photons, and

state bags. Multiple galaxies.
\$19.95 Level I cassette
\$19.95 Level II cassette
\$119.95 for delivery by Mr Spock

THURD

A stack-oriented interpretive compiler language for those of you familiar with RMN (Reverse Mandarin Notation). Thurd has achieved wide acclaim by aerospace giants (Lockheed Industries, South American Rockwell) and government agencies (Post Office, NRC). \$29.95 Disc version

CLOCK UPGRADE

Increase your clock to 144 megahertz. Operate 75 times as fast! Complete kit includes waveguides and all shielding. 155 lbs. Shipped rail freight \$59.95

FORGOL-II

A powerful high-level language by the professionals who pieced together Level II. Double-precision up to two digits. Extensive mathematical subroutine library for integer addition and subtraction.

(Sorry, integer multiply/divide not supported in this TRS-80 version). Includes FORCOMP Compiler, FORED Editor, FORLOAD Loader, and FORKOFF Sublicense Agreement. This powerful compiler can now be yours for only

\$1295.95 (6 diskettes)

\$8.95 (documentation)

\$99.95 (adequate documentation)

TRS-80 PROGRAMMING FOR THE MENTALLY IMPAIRED

By the author of the Z-80 Microcomputer Handbook. Sections cover: Unpacking the system, driving to the Service Center, calling Fort Worth (special appendix on Raising Hell), Loading Cassettes from Disk and key Stroking for Minimum Bounce 212 pages, illustrated with over 3 figures.

\$8.95 softcover

\$7.95 autographed

Our thanks to Bill for allowing us to share these exceptional values. Seriously though, OCTUG has a new address and phone number. Bill Barren is the Editor, at 28182 Palmada, Mission Viejo, CA 92692 (714) 951-0129

From the Originator of the TRS-80 Project

FORTRAN Now Sale Priced!

Comparable to compilers on large mainframes and minicomputers. All of ANSI Standard FORTRAN X3.9-1966 is included except COMPLEX data type. Therefore, users may take advantage of the many applications programs already written in FORTRAN. Package includes:

FORTRAN Compiler
Macro Assembler (Z80)
Linker

Library
Lib Manager (Not in TRS-DOS version) Price \$220.00

For this month only

Sale Priced at \$250.00

Manual \$25.00

(Specify TRS-DOS or CP/M versions)

PASCAL

UCSD Pascal, the powerful general purpose language system, developed for large and complex programs is now available for your TRS-80.

The FMG-UCSD PASCAL system opens a new generation of value for your TRS-80. Package includes:

Operating System
Screen Editor
Z80 Macro Assembler
Debugger
Pascal Compiler
Utilities and System Reference Book
Requires 48K System with 2 Drives
Available without
Macro Assembler
Linker and Debugger \$150.00

CP/M OPERATING SYSTEM

Editor, Assembler, Debugger and Utilities for 8080 and Z80 Systems. Up to four floppy disks. Package includes:

CP/M System Diskette 5 1/4"

CP/M Features and

Facilities Manual

CP/M Editor's Manual

CP/M Assembler Manual

CP/M Debugger Manual

CP/M Interface Guide \$150.00
(Set of 5 manuals \$25.00)

Dial or Write
FMG - for complete information



A Division of Applied Data Resources
P.O. Box 18000, Fort Worth, Texas 76123, (817) 284-0201

NEW PRODUCTS

PERCOM INTRODUCES BASIC LANGUAGE DOS FOR TRS-80
Percom Data Company, Garland, Texas has introduced a disk operating system for the TRS-80 that works entirely with Level II BASIC commands. Called MICRODOS (tm), the program resides in less than 7K of memory, yet is both faster and more powerful than TRSDOS. MICRODOS (tm) was developed for business and professional applications and operates the Percom TFD series of mini-disk systems, a family of small, medium and large capacity add-on storage devices for the TRS-80. MICRODOS (tm) is supplied on a system diskette which also includes three BASIC programs: (1) a file management program, (2) a disk utility program which illustrates how disk utilities may be written with only a few BASIC statements, and (3) a sample application program entitled "The Percom 5% Basic Notebook", an expandable disk-based "notebook" of information about MICRODOS (tm) disk BASIC statements. The notebook may be easily accessed or changed by the user.

THE MICRODOS (tm) system diskette, which includes the operating system, BASIC programs and program menu, sells for \$29.95. It is included free, however, with the purchase of one of the large capacity TFD-1000 (tm) storage units. Versions are available for all TFD models. Orders may be placed by calling Percom's toll-free number, 1-800-527-1592, and may be paid by check or money order, COD or charged to VISA or Master Charge. Texas residents must add 5% sales tax. Percom Data Co. 211 N. Kirby, Garland, Texas 75042.

EDUMATICS, Corp. PO Box 36, Oceanport, NJ 07757 announced its entry into the field of educational software publishing for microcomputers for home, school and industry. The firm is initiating three complementary series of software products. Their General Education Series will focus on elementary and secondary school level subjects with an innovative approach to microcomputer assisted instruction particularly suited to young children. Prospective authors are invited to request an Author's Information Kit.

THE SOFTWARE ASSOCIATION PO Box 56365, Houston, TX 77058 has announced a new line of entertainment programs for the TRS-80. All programs are written in machine language and provide extremely fast response times. The initial offering includes Z-CHESS, a full featured chess opponent which provides seven levels of difficulty from "Bite" to "Expert". BAG-40 is a superior backgammon challenger with an unrivaled graphic board display. DR CHIPS is based on the famous "DOCTOR" and "ELIZA" programs.

A new catalog from ELECTRONIC SPECIALISTS presents their line of MICROCOMPUTER Interference control products. Protective devices are also included. Descriptive sections are included which outline particular problems. Suggested solutions are given. Typical applications and uses are outlined. Request catalog 971. ELECTRONIC SPECIALISTS, Inc. 171 South Main St. Natick, MA 01760 (508) 655-1532

MICROMATION 1626 Montgomery, San Francisco, CA 94111 has interfaced the popular MEGABOX floppy disk system to the TRS-80. This 5-inch dual drive, double density floppy disk system allows users of the TRS-80 to access several megabytes of high speed disk storage. The MEGABOX includes provision to add 32K of RAM and a UART with RS-232 interface, so the MEGABOX can be used with the TRS-80 alone to provide a complete ARK system, capable of supporting a printer.

NEW ENGLAND BUSINESS SERVICE INC (NEBS), North Main St. Groton MA 01462 has IMPRINTED CONTINUOUS FORMS (Invoices, Statements, Payroll Checks and All-Purpose checks) for use with your Business Microcomputer. They ship within 8 working days and orders may be as few as 250 forms. They also have "see-through" window envelopes to eliminate envelope addressing. Phone Toll-Free 1-800-225-6380 (MA residents 1-800-250-9236)

APPLIED ECONOMIC ANALYSIS 4005 Locust Ave, Long Beach Ca 90807 (213) 424-3252 has announced the release of the most comprehensive BUSINESS PLANNING PACKAGE yet available for the TRS-80. This disk based package contains a set of forecasting programs which will allow the small business user to solve a variety of business forecasting needs. Included in the package is an advanced version of multiple regression along with a seasonal adjustment program and another forecasting program. The data preparation program allows the creation, modification and deletion of disk-based data sets. The data sets are accessible by all programs. Write or call for more information.

MATCHLESS SYSTEMS MS-80 MINI DISK SYSTEM

MATCHLESS Systems has introduced the new MS-80 Mini Disk System, which can save TRS-80 owners over \$100. For an introductory period, Matchless is offering a special price of \$395. The system includes a minifloppy disk drive, power supply cable, regulator board and compact case. The system increases usable storage capacity 23% from 55,000 to 67,800 bytes on the first drive. It has five additional tracks (40 tracks, rather than 35). It also has faster access time (5ms versus 40ms for the TRS-80 Disk System). It is completely compatible with the TRS-80 DOS. Most important, Matchless provides off-the-shelf availability. For literature or ordering information, contact Mike Comer, Matchless Systems, Dept. P1, 18444 South Broadway, Gardena, CA 90248 or call (213) 327-1010.



The new Matchless MS-80 Mini Disk System for TRS-80 owners.

COMPROC extends the DOS-AUTO command to perform MULTIPLE steps either at power-up or as a single user system command. Running of an application program is now made simple and automatic - even for the inexperienced user. The script executed by COMPROC consists of a sequence of commands or data (such as VERIFY, DIR, BASIC, LOAD, RUN, etc). This script is easily changed, created and saved using the AUTO/EDIT/SAVE facilities of BASIC. Available from RACET COMPUTES 702 Palmdale, Orange, CA 92665.

APPARAT INC 6000 E Evans Ave #2, Denver, CO 80222, aside from being the creators of NEWDOS and NEWDOS +, have a line of high quality-low cost Small Business Software. They also carry a line of Hardware, including Disk Drives, Printers and Memory Expansion Kits.

GPA ELECTRONICS Inc PO Box 7410, Oakland, CA 94601 (415) 459-1221 have a Full Support System for the TRS-80 which includes a Motherboard which plugs directly into the keyboard and allows expansion to 32K of RAM, EPROM firm ware, Disk Control, Data Acquisition and Parallel/Serial I/O. The Motherboard, which comes assembled and tested sells for \$129.95.

TRS-80 MODEL II MICROCOMPUTER SYSTEM Radio Shack has introduced their all-new TRS-80 Model II, designed to meet the needs of many users for more data storage, greater versatility and higher computing speed. The new computer has been primarily designed for the small business application market. It can perform as a general purpose data processing machine, an intelligent terminal or a word processor. According to Radio Shack, the Model II is not intended to replace or obsolete Model I, but to provide capabilities that begin where the original TRS-80 approaches its upper limits. Mod II is said to operate at twice the speed of the original model.

In addition to either 32 or 64K bytes of internal RAM, Mod II has one built-in 8 inch floppy disk which stores an additional one-half million bytes, including the DOS. It can be expanded to a four disk system for up to two-million bytes of storage.

Model II has a 12 inch high-resolution video monitor which displays 24 lines of 80 characters. It features upper and lower case letters.

The Model II system is priced from \$3450 for the 32K 1-disk system. Available through Radio Shack stores and Computer Centers, and participating Radio Shack dealers, nationwide.

THE COMPUTER BUGS, PO Box 789, Boynton Beach, Florida 33435 have developed three software packages for the TRS-80 Disk Based System. A Text Editor requiring 32K one drive, a Rental Control System requiring 48K two drives and an Inventory Control System requiring 48K two drives.

IMI, Interactive Microware Inc PO Box 771, State College, PA 16801 has developed a library of unique TRS-80 software. Three new games were announced, all incorporating their "REAL-TIME" simulation: A compact Graphics Interpreter, a Lunar Lander Simulator and Battle Grid. A program to allow Level II Basic screen listings to scroll line by line as in Level I may be obtained free with any order.

EMU 02: How to have 6502 without having a 6502! EMU 02 is software emulation of the MCS/SY 6502 8-bit microprocessor for the TRS-80. EMU 02 gives you the means by which you can write, debug and execute 6502 object code programs on the TRS-80; it opens the way to software communication between the TRS-80 and 6502 based machines such as the Apple II and Commodore PET. 16K Level II, links with your TBUG. \$24.95 from Allen Gelder, PO Box 11721, San Francisco.

(continued on Page 52)

Radio Shack TRS-80 Model II Microcomputer



CLUBS AND PUBLICATIONS

STUC, the Solano TRS-80 User's Club meets every third Thursday starting July 5th at Owens-Illinois, 2500 Huntington Drive, Fairfield, California. The group is BASICally informal, just getting together to discuss mutual problems and experiences. Contact Dave or Steve Irwin at (707) 422-3347.

MADISON, WI TRS-80 USERS GROUP meets the fourth Tuesday of each month at 7:00 PM in the Madison Public Library, Main Library, 201 West Mifflin. The organization has over 40 members. Contact Peter Daly (608) 251-6531.

The TRS-80 USER GROUP of TACOMA, Washington meets at 7:30 PM on the final Thursday of each month at the corner of 28th Street and Proctor. There is STILL no organization, no contact, and you just show up to see what will happen. This is one of the oldest non-organizations, and it must have something going, because people still show up.

Creative Discount Software has announced the opening of its new SOFTWARE OF THE MONTH CLUB. The new service, according to Pat Masterson, is a natural

extension of the firm's other large volume software distribution programs. The idea came from numerous computer clubs currently being served. The Software Club will utilize the negative option sales program currently used by "book" and "record" clubs and will capitalize on volume purchasing power to offer favorable prices to members. Membership enrollment applications are available from Creative Discount Software, Software of the Month Dept. 256 S Robertson, Suite 2156 Beverly Hills, CA 90211.

MARIN COMPUTER CENTER, located in the library at Oakview school in San Rafael, CA, is a non-profit, educational organization, whose purpose is to bring the wonders of advanced technology within the reach of all people. Towards this end, they have placed 17 microcomputers in the kind of spacious, comfortable environment which has rarely been associated with computer. Some of the services offered at MCC are computer classes for kids and adults, school field trips, birthday parties and, of course, drop-in computer use. They will also give reviews. Send your best game cassettes to the MARIN COMPUTER CENTER, Oakview School 70 Skyview Terrace, Room 301, San Rafael, CA 94903. For

more information call David Fox at (415) 472-2850.

COMPUTERMAT (tm) has gathered 3000 program listings, 200 suppliers and put together a 75 page catalog called "The TRS-80 Software Source". It is published three times per year in the spring, summer and fall. COMPUTERMAT, Box 1664 Lake Havasu City, AZ 86403.

T-PAL (tm) is published monthly for TRS-80 owners by Ed Thorne. Subtitled "Programming Amateur's Letter", the first (complimentary) issue was dated 1979, and contained 8 pages of interesting ideas, programs and general information on the TRS-80. Subscriptions are \$24.00 for a one year hitch. The Mail Mart, PO Box 11102, San Francisco, CA 94101.

THE COMPUTER EXCHANGE 2217 Freeland Way, Dallas, TX 75228 published Vol 1 No 1 in May 1979. Jeff Villwock is the Editor. It is designed to give the personal and small business computer user the opportunity to communicate with others through the use of very inexpensive classified advertising. It costs \$5.00 per year, is published monthly and is sent first class.

FOR THE LITTLE NYBBLERS

L.B. Christopherson

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A piano fell upon its owner
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It unburdened itself of 3/5 of its weight
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There the man sat
As if in a trap...
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Was taken right out of its sound?



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A TRS-80

LINE SPOOLER

Anthony F. Pepin, Tacoma, WA

The word "SPOOL" means many things to many people. Like most words in Data Processing, it is an acronym. It stands for "Special Peripheral Operation On Line". Basically, it is a method of using a slower speed peripheral without having to wait for it. In big mainframe computers, a SPOOLER (that which SPOOLS) is an important piece of software.

The SPOOLER is used to transfer data from one place to another without affecting whatever else is going on in the computer. This could be the transfer of one disk file to another, or it could be

from a tape file to a disk file, or even a tape file to a tape file. However, the most important function of a SPOOLER is the outputting of data to a printer.

Have you ever had a program that had to do a lot of printing at the same time it had to do a lot of calculations? Consider a payroll function. You have to produce 20 or more payroll journal entries. So you load your special form paper into the printer and run your program. The printer prints a line and stops. After a couple moments, it prints another line and stops. This goes on until all the entries

have been processed. What has happened is that the program computes the entry, prints the entry, then begins the next entry. The program has to wait for the printer to finish printing before it can begin the next calculation. In the meantime you are sitting back watching it work.

What follows is a solution to that problem. This is a SPOOLER that works on a line at a time. In a program like the one described above, it can save a significant amount of elapsed time during program execution.

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AMERICAN and CANADA FOR MICROCOMPUTERS

As you may know, the real time clock in DOS is run using timer interrupts from the expansion interface. The SPOOLER is driven from those same interrupts. This means that the SPOOLER is sharing resources with the BASIC program. Both the Basic program and the Spooler can run simultaneously. (Time sharing on the TRS-80!)

You can tell the SPOOLER to print your line, go ahead and do your calculations, then check to see if the line is printed yet. If it is, you can format your next line, tell the SPOOLER to print it, and begin the next calculations. (Repeat as necessary.)

Look at figure 1. This is the SPOOLER itself. In the listing, the origin of the program is at hex address "FFC3". If you do not have a 48K system, that can be changed to "BFC3" for 32K system or "7FC3" for a 16K system as necessary. Communication with the SPOOLER is achieved by PEEKs and POKEs in the last three positions of memory: the two fields "ADDR" and "COUNT".

"ADDR" is the address of the string data to be printed. It is in the standard low-order-byte/high-order-byte addressing scheme of the Z80 processor. (If the suggested method of interfacing to Basic is used, you will not need to be concerned about the address.)

"COUNT" is the number of characters that remain to be output to the printer.

When this field is zero, the string has been totally output. COUNT is used to start the SPOOLER and to tell when the SPOOLER has finished.

I have the SPOOLER on disk as a /CMD file so that to load it all I have to do is enter "SPOOL". I could also enter "LOAD SPOOLCMD" and the program would load. (I love APPARAT's disk based EDTASM!) However you decide to do it, the SPOOLER has to be loaded before it can be used.

When you load Basic, set memory size below where the SPOOLER resides. At most 85474 for 48K machines, 49090 for 32K machines, and 32706 for 16K machines.

Once Basic is loaded, it has to be set so that the interrupt will access the SPOOLER. Look at figure 2. Lines 70 thru 90 of the demonstration program show how to do this. (Lines 260 thru 280 show how to disconnect it from the interrupt table.) These commands turn off the interrupt so that you can safely change the table. If you did not do this, you could have an interrupt in the middle of changing the table and ANYTHING could happen. (As IBM would say, the results would be unpredictable.)

To communicate with the SPOOLER, you need to know both the address of the string data and the character count of the string. If you refer to the Level II Reference Manual on pages 8/8 and 8/9,

you will find a discussion on the 'VAR-PTR' function. For strings, it will return you the addresses where this data is kept; a pointer to the pointers if you will. This data can be transferred to the SPOOLER by the simple expedient of POKEing a PEEK.

Lines 180 thru 180 show how to start the SPOOLER working on the string you want printed. I must emphasize how important it is to poke the count field last (line 180). Once this field is non-zero, the SPOOLER will start to print from the address it has, even if you are in the process of changing it!

When your program is ready to print another line, you must make sure that the SPOOLER has finished its last line. This is done in the demo program by lines 230 and 240. As you can imagine, unpredictable results develop if you change the string address before the SPOOLER has finished the line.

There are a couple of things to be careful with when using this SPOOLER. Most of these are pointed out above. I should point out that once the SPOOLER is set up, it will stay set up until it is disconnected. You could set it up at the beginning of the day and access it all day long from different programs if you wanted to. But I would suggest that you disconnect the SPOOLER before returning to DOS. It may not hurt to leave it, but you might as well be sure.

```
10 REM THIS IS A TEST/DEMO PROG FOR THE TRS-80 LINE SPOOLER
20 REM WRITTEN FOR 80-US BY APP TACOMA, WA
30 CLS
40 CLEAR 500
50 INPUT"DID YOU REMEMBER TO SET MEMORY SIZE";RESS$
60 IF LEFT$(RESS,1)="N" THEN CMD"S"
70 CMD"T"
80 POKE &H4510,&HC3:POKE &H4511,&HFF: REM SET UP SPOOLER
90 CMD"R"
100 REM THE 'FF' MUST BE CHANGED TO 'BF' OR '7F' FOR SMALLER MACHINES
110 PRINT
120 INPUT "WHAT IS YOUR TEST STRING";AS
130 IF AS="END" THEN 260
140 X=VARPTR(AS):REM THIS LOCATES THE VARIABLE POINTER
150 I=&HFFFFD:REM CHANGE TO 'BFFD' OR '7FFD' AS NEEDED
160 POKE I,PEEK(X+1):REM SET UP LOW ORDER ADDRESS OF STRING
170 POKE I+1,PEEK(X+2):REM SET UP HI ORDER ADDRESS OF STRING
180 POKE I+2,PEEK(X):REM LOAD THE COUNT-THIS STARTS THE SPOOLER
190 REM WHILE SPOOLER SPOOLS:
200 FOR J=1 TO 50
210 PRINT J,J*j
220 NEXT J
230 Y=PEEK(I+2)
240 IF Y<>0 THEN 230:REM MAKE SURE PRINT IS OVER
250 GOTO 110
260 CMD"T":REM HAVE TO STOP SPOOLER NOW
270 POKE &H4510,&HA3:POKE &H4511,&H45
280 CMD"R"
290 END
```

Figure 2

00100 ;THIS IS A PRINT SPOOLER
 00110 ;WRITTEN FOR 80-US JOURNAL BY APP TACOMA, WA
 37E8 00120 PPORT EQU 37E8H
 00130 ;THE ORG CAN BE CHANGED TO BPC3 OR 7FC3 AS NEEDED
 FFC3 00140 ORG OFFC3H
 FFC3 CSFF 00150 SPOOL DEFW ENTER ;POINT TO ROUTINE
 FFC5 P5 00160 ENTER PUSH AF ;SAVE WORKING REGISTERS
 FFC6 E5 00170 PUSH HL
 FFC7 3AFFFF 00180 LD A,(COUNT) ;HOW MANY CHARS LEFT?
 FFC8 B7 00190 OR A
 FFCB 281D 00200 JR Z,EXIT ;IF ZERO, EXIT ROUTINE
 FFCD 3AE837 00210 LD A,(PPORT) ;IS PRINTER READY?
 FFD0 E6F0 00220 AND OFOH
 FFD2 FE30 00230 CP 30H
 FFD4 2014 00240 JR NZ,EXIT ;IF NOT READY, EXIT
 FFD6 2AFDFF 00250 LD HL,(ADDR) ;WHICH STRING CHR IS NEXT
 FFD9 7E 00260 LD A,(HL) ;LOAD NEXT CHAR
 FFDA 32E837 00270 LD (PPORT),A ;OUTPUT CHAR
 FFDD 3AFFFF 00280 LD A,(COUNT)
 FFE0 3D 00290 DEC A ;ONE LESS CHAR TO OUTPUT
 FFE1 32FFFF 00300 LD (COUNT),A
 FFE4 2807 00310 JR Z,CRIT ;IF LAST CHAR, GO TO CRIT
 FFE6 23 00320 INC HL ;INCREMENT STRING ADDRESS
 FFE7 22FDFF 00330 LD (ADDR),HL
 FFEA E1 00340 EXIT POP HL ;RESTORE REGISTERS AS WAS
 FFE8 F1 00350 POP AF
 FFE9 C9 00360 RET
 FFED 3AE837 00370 CRIT LD A,(PPORT) ;PUT CR BEHIND LAST CHR
 FFF0 E6F0 00380 AND OFOH
 FFF2 FE30 00390 CP 30H
 FFF4 20F7 00400 JR NZ,CRIT ;LOOP UNTIL PRINTER READY
 FFF6 3E0D 00410 LD A,ODH ;LOAD THE CR
 FFF8 32E837 00420 LD (PPORT),A ;OUTPUT THE CR
 FFFF 18ED 00430 JR EXIT
 FFFD 0000 00440 ADDR DEFW 0 ;ADDRESS OF STRING DATA
 FFFF 00 00450 COUNT DEFB 0 ;# OF CHARS REMAINING
 4400 00460 END 4400H ;RETURN TO DOS
 00000 TOTAL ERRORS

ADDR	FFFD	00440	00250	00330		
COUNT	FFFF	00450	00180	00280	00300	
CRIT	FFED	00370	00310	00400		
ENTER	FFC5	00160	00150			
EXIT	FFE4	00340	00200	00240	00430	
PPORT	37E8	00120	00210	00270	00370	00420
SPOOL	FFC3	00150				

Figure 1

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INFORMATION



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Drawing Board

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Rod Hallen

Computer graphics has always been a special interest of mine and as soon as I bought my 16K Level II machine, I began experimenting with various ways of drawing pictures on the screen. I quickly discovered that you can either SET or RESET each individual graphics location on the 128 horizontal by 48 vertical screen grid or you can POKE the graphics characters (ASCII 128 to 191) directly to screen memory.

Either method will work but trying to draw a picture and be able to see what it looks like as you draw is difficult. The Cursor, the READY, and the POKE, SET, and RESET statements kept getting in the way or they scroll the picture off of the screen. Writing a program to draw the whole picture all at once works but it is hard to change. There had to be a better way.

What I wanted was a program that would allow me to draw a picture on the screen without anything getting in the way. I also wanted to be able to save the picture on tape so that I could

load it later for use or modification. Another requirement was the ability to mix letters, numbers, and punctuation with the graphics characters. "Drawing Board" is the happy result of this programming effort.

Description: CLOAD and Initialization

After "Drawing Board" has been CLOADED and RUN, you are given two choices. First, are you going to LOAD a previously SAVED picture or CREATE a new one? If you want to start a picture from scratch, hit ENTER and you'll move to the Graphics subroutine. Typing "L" and ENTER will route you to the LOAD routine which we'll discuss a little later.

Graphics Mode

Once you get here, you will be asked if you want instructions. During the initial part of the program you will probably notice a couple of delay periods. These are actually being used to

TRS-80, Sol, Sorcerer.



byte storage capacity can be operated with general ledger, accounts receivable, and payable.

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set-up and initialize the screen display (G) array. After reading or by-passing the instructions, you will be presented with a blank screen except for an arrow in the upper left hand corner.

This arrow is the cursor and it tells you in which direction it will move. Press each of the four direction keys on the TRS-80 keyboard once and watch the effect that each has on the cursor. It should change to agree with the last direction key pressed.

Now press each direction key a half dozen times. Note that the arrow points in the desired direction after the first key press and that it then moves one space in the same direction for each subsequent key press. Play with this a little to get the feel of it. Note also, that if you move the arrow off of the edge of the screen, it will re-enter on the opposite edge.

If this occurs, the following rules apply:
When moving RIGHT, it will re-enter on the LEFT edge one line down.

When moving DOWN, it will re-enter on the top edge one column to the right.
Anytime you run off of the lower righthand corner or the upper lefthand corner you will find yourself in the diagonally opposite corner.

When moving LEFT, it will re-enter on the RIGHT edge one line up.
When moving UP, it will re-enter on the bottom edge one column to the left.

This can be used to advantage. Say that the arrow is on the extreme lefthand side and you want to move to the extreme right. Instead of moving 60 or so spaces across the screen, move in the opposite direction and you'll pop up on the other side in a very few moves. The same works top to bottom.

Once you can move the cursor to any desired location, you are ready to start drawing. Each of the ASCII character codes between 128 to 191 is a graphic symbol. Figure 1 is a representation of all 64 symbols. By combining these symbols in different ways, you can draw pictures on the TRS-80 video screen.

Now type "191". Nothing visible will happen but the code "191" will be stored in a character buffer. Next press the "@" key and the block which is associated with code "191" will appear wherever the arrow was located and the arrow will move one space in the direction it was facing. Press "@" again and you should get the same result. Try a dozen more "@"'s.

Type "149" and give it some more "@"'s. Each time that the "@" key is pressed, the code that is stored in the character buffer will be poked to the arrow location on the screen. The same symbol will always be poked whenever the "@" key is pressed until a new graphics code is entered. Press a different arrow and then some more "@"'s. Now press one arrow a few times and note that it moves without depositing a symbol and yet you can still drop one each time you press "@".

This allows you to move in all four directions leaving a trail of symbols or not as desired. Try making some simple figures such as tall alphabetic characters out of the "191" code. After you are done you can go back and change or erase as required. You can erase an undesired symbol by placing an arrow on it, entering the desired code, and pressing "%".

"128" is the code for completely erasing a symbol position. When "Drawing Board" is first loaded, it will place "128" at every screen location and in the character buffer. Pressing "%" will appear to do nothing but it is really POKEing blank symbols that you can't see.

If you press "%" and a question mark (?) appears on the screen, this indicates that a code less than 128 or more than 191 was entered. This is usually the result of keyboard bounce. In such a case, back up, enter "128" or some other desired code, and erase the ? with an "%".

Alphanumeric Mode

I mentioned earlier that I wanted to be able to mix letters, numbers, and punctuation with the graphics symbols. That is the purpose of the Alphanumeric Mode. It is entered at anytime, from the Graphics Mode, by pressing "/". You won't note any change on the screen but from now on you can press any key and the corresponding character will appear at the arrow location and the arrow will move as before. The "CLEAR" key will return you to the Graphics Mode at any time.

There are some special rules that apply to the Alphanumeric Mode:

1. You cannot change the direction of the arrow while in the mode. It must be facing the desired direction upon entry.
2. You cannot move the arrow without depositing something.
3. Commas (,) and colons (:) are not allowed on the screen. If you accidentally enter one, erase it before you call the SAVE routine.
4. The first position in each horizontal line cannot be a space.

Rules 3 and 4 are the result of Level II string requirements. Rule 4 applies only to spaces

which are deposited with the space bar in the Alphanumeric Mode. It does not apply to blanks deposited by code "128" in the Graphics Mode and it does not apply to blanks that are on the screen when "Drawing Board" is first initialized. Just remember not to hit the space bar while the arrow is in the first position of any horizontal line and never use the "ENTER" key while a picture is on the screen!

Upon return from the Alphanumeric Mode, the character buffer will contain a ? to remind you that you are back in the Graphics Mode.

SAVE Mode

Once you have finished your picture or decide to put it away for another time, you'll want to call up the SAVE Mode. SAVE is entered from the Graphics Mode by pressing SHIFT "/" which is the "?" character. A message will replace your picture on the screen and it will give you the opportunity to set your recorder for a save.

It is extremely shocking the first time you see your masterpiece suddenly disappear from the screen but don't worry, it is safely stored in an array. The repacking mentioned in the SAVE message takes the screen display array and converts it to a series of string arrays. SAVEing the screen display array on tape would take almost five minutes, while the repacked data only takes about 30 seconds to record.

When the SAVE function is complete, you can go back and work on your picture some more or exit the program. ENTER goes back and "E", ENTER exits "Drawing Board."

LOAD Mode

If upon initial program entry, you selected the LOAD Mode, you'll get a message that says, "PREPARE YOUR RECORDER FOR LOADING" and "HIT ENTER WHEN READY." Position the tape to the beginning of a picture previously recorded with the SAVE Mode and press ENTER.

After the "LOAD" subroutine has taken the picture from the tape, it will reconstruct it on the screen. When this is finished, the arrow will appear in the upper lefthand corner of the screen and you will be in the Graphics Mode. You can make any changes to the picture that you like and then SAVE the new version.

There isn't any limit to the number of times that you can do this. It would be a good idea to keep more than one copy of any pictures that you have a lot of effort invested in. This will help to protect you from tape operations failures.

Conclusion

Once you start to remember some of the graphic character codes, you'll find yourself putting pictures together quite quickly. The only limitation is that imposed by the 128 by 48 screen grid. There is really a lot that you can do

within that limitation. A rough hand-drawn outline of your picture - prepared ahead of time - helps with the creative process.

Another use for this program is to draw pictures for other programs, games, for instance. First draw the picture and SAVE it on tape. Then take lines 840 to 910 out of "Drawing Board" and place them in the desired location in the other program, changing line numbers to fit. With the recorder set to the beginning of the picture and

configured for PLAY, RUN the program. When it comes to the LOAD routine, it will get the picture from the tape and put it on the screen. What happens after that, of course, is up to the program that is running.

While practice hasn't made me a great artist, it has allowed me to greatly improve my video graphics. I can only hope that "Drawing Board" in the right hands will result in some REAL works of art!

```
100 REM TRS-80 PICTURE DRAWING ROUTINE
110 REM (C) COPYRIGHT 1979 BY ROD HALLEN TOMBSTONE, AZ 85638
120 CLEAR1500:DIMG(1040),G$(16)
130 CLS:PRINT:PRINTTAB(24)"DRAWING BOARD"
140 PRINT:PRINTTAB(21)"(C) COPYRIGHT 1979
150 PRINT:PRINTTAB(13)"BY ROD HALLEN TOMBSTONE, AZ 85638"
160 FORK=0TO511:G(K)=128:NEXT:PRINT
170 PRINTTAB(8)::INPUT"DO YOU WANT TO CREATE A PICTURE OR LOAD ONE";Y$
180 IFLEFT$(Y$,1)="L"THEN840
190 PRINT:PRINTTAB(16)::INPUT"DO YOU WANT INSTRUCTIONS ";Y$:CLS
200 IFLEFT$(Y$,1)<>"Y"THEN380
210 PRINT:PRINT"THE ARROW ON THE SCREEN IS CONTROLLED BY THE DIRECTION
  KEYS"
220 PRINT"ON THE KEYBOARD.      PRESSING A DIRECTION KEY WILL MOVE THE"
230 PRINT"ARROW ONE SPACE IN WHICHEVER DIRECTION IT IS FACING.  IF"
240 PRINT"YOU ENTER A 3 DIGIT CODE (FROM 128 TO 191) AND PRESS THE"
250 PRINT"'@' KEY, THE APPROPRIATE SYMBOL WILL BE DEPOSITED AT THE"
260 PRINT"THE ARROW LOCATION AND IT WILL MOVE ONE SPACE.  CONTINUING"
270 PRINT"TO PRESS THE '@' KEY WILL DEPOSIT A TRAIL OF SYMBOLS.  YOU"
280 PRINT"CAN CHANGE THE SYMBOL CODE ANYTIME YOU LIKE."
290 PRINT:INPUT"PRESS ENTER TO CONTINUE ";R
300 CLS:PRINT"YOU ENTER THE ALPHANUMERIC MODE BY PRESSING '/'.  THEN
  EACH"
310 PRINT"KEYBOARD CHARACTER WILL APPEAR ON THE SCREEN AS YOU TYPE"
320 PRINT"UNTIL YOU PRESS 'CLEAR' WHICH RETURNS YOU TO THE GRAPHIC"
330 PRINT"MODE.  YOU CANNOT CHANGE THE DIRECTION OF THE ARROW WHILE"
340 PRINT"IN THE ALPHANUMERIC MODE.  PRESS 'SHIFT /' WHILE IN THE"
350 PRINT"GRAPHIC MODE TO ENTER THE SAVE MODE."
360 FORK=512TO1023:G(K)=128:NEXT
370 PRINT:INPUT"PRESS ENTER TO CONTINUE ";R:CLS
380 I1=1:D=94:E=128
390 FORK=0TO5000
400 POKEI+15360,D
410 A$=INKEY$:IFA$=""THEN410
420 IFASC(A$)>47ANDASC(A$)<58THEN540
430 IFASC(A$)<>8THEN450ELSEIFD=93THEN600
440 D=93:I1=-1:GOTO660
450 IFASC(A$)<>9THEN470ELSEIFD=94THEN600
460 D=94:I1=1:GOTO660
470 IFASC(A$)<>10THEN490ELSEIFD=92THEN600
480 D=92:I1=64:GOTO660
490 IFASC(A$)<>91THEN510ELSEIFD=91THEN600
500 D=91:I1=-64:GOTO660
510 IFASC(A$)=64THEN590
520 IFASC(A$)=63THEN690
530 IFASC(A$)<>47THEN660ELSEGOTO950
```

```
540 B$=INKEY$: IFB$="" THEN 540
550 C$=INKEY$: IFC$="" THEN 550
560 E=VAL(A$+B$+C$)
570 IFE<1280RE>191THEN E=63
580 GOTO 660
590 G(I)=E
600 POKE I+15360, G(I)
610 IF I1=1 AND I=>1022 THEN I=-1
620 IF I1=-1 AND I<=0 THEN I=1023
630 IF I1=64 AND I>959 THEN I=I-1023
640 IF I1=-64 AND I<64 THEN I=I+1023
650 I=I+I1
660 NEXT
670 END
680 REM TEST SAVE ROUTINE
690 CLS:PRINT"PREPARE YOUR RECORDER FOR A SAVE. WHILE YOU'RE DOING
THAT,"
700 PRINT:PRINT"I'LL BE REPACKING THE SCREEN DATA FOR A QUICKER
RECORDING."
710 FOR I=0 TO 15: G$(I)=""
720 FOR J=0 TO 63
730 G$(I)=G$(I)+CHR$(G(J+I*64))
740 NEXT:NEXT
750 PRINT:INPUT"HIT ENTER WHEN READY. "; R
760 FOR J=0 TO 12 STEP 3
770 PRINT#-1, G$(J+0), G$(J+1), G$(J+2)
780 NEXT J
790 PRINT#-1, G$(15)
800 PRINT:PRINT"SAVE COMPLETE":PRINT
810 INPUT"DO YOU WANT THE GRAPHIC MODE OR EXIT "; Y$
820 IF LEFT$(Y$, 1)="E" THEN END ELSE I=0:GOTO 900
830 REM TEST LOAD ROUTINE
840 CLS:PRINT:PRINT"PREPARE YOUR RECORDER FOR LOADING. "
850 PRINT:INPUT"HIT ENTER WHEN READY. "; R
860 FOR J=0 TO 12 STEP 3
870 INPUT#-1, G$(J+0), G$(J+1), G$(J+2)
880 NEXT J
890 INPUT#-1, G$(15):CLS
900 FOR L=0 TO 15: FORM=0 TO 63
910 G(L*64+M)=ASC(MID$(G$(L), M+1))
920 POKE L*64+M+15360, G(L*64+M)
930 NEXT M:NEXT L
940 GOTO 380
950 REM ALPHANUMERIC MODE
960 POKE I+15360, D
970 A$=INKEY$: IF A$="" THEN 970
980 E=ASC(A$)
990 IFE=31 THEN E=63:GOTO 660
1000 G(I)=E
1010 POKE I+15360, G(I)
1020 IF I1=1 AND I=>1022 THEN I=-1
1030 IF I1=-1 AND I>=0 THEN I=1023
1040 IF I1=64 AND I>959 THEN I=I-1023
1050 IF I1=-64 AND I<64 THEN I=I+1023
1060 I=I+I1
1070 A$="/" :GOTO 530
```

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THE ANATOMY OF THE PROGRAM

R.C. Bahn

REFERENCE: Hallen, R., Picture Drawing Program

SUMMARY: An operator interactive Level II graphics program to create an image on the TRS-80 video display. The positions of either graphics or alphanumeric symbols are designated

through an active keyboard. The image may be stored on magnetic tape and subsequently recalled.

PROGRAM MODULES: The program may be divided into five modules. The first is INITIALIZATION, and extends from lines 100 to 370. The second

module is GRAPHICS MODE and extends from lines 380 to 670. This third is TAPE SAVE and extends from lines 680 to 820. The fourth module is TAPE LOAD and extends from line 830 to 940. The last module is ALPHANUMERIC MODE and extends from lines 950 to 1070.

LINE BY LINE COMMENTARY

100 - 370	Initialization module. Tape program identification.
100 - 370	A sufficient amount of storage space is cleared for string variables. The two arrays (G, GS) are dimensioned. G should be at least 1024.
120	Videoscreen program identification. PRINT TAB (N) statements center the text on the screen.
130 - 150	Initialization of values in G(K). A total of 512 values of 128 (binary 01000000) are stored. This functions to zero stored video screen image. Placement of loop at this point functions also as a screen timing device.
160	The option for loading tape is offered and tested.
170 - 180	The option for instructions is offered and tested.
190 - 200	The instructions are printed on the screen. Note the pause at the end of the full screen.
210 - 290	The user continues instructions by entering dummy variable R.
290	The screen is cleared and the second panel of instructions are printed.
300 - 350	While user is reading screen, the second half of G(K) is initialized. See line 160.
360	The program is continued by a press ENTER. The variable R is used similarly in lines 290 & 750.
370	The variables H, D and E are initialized.
380	The beginning of the FOR-NEXT loop which extends to line 860. The value of K is large and

Is sufficient to enable operator to define and redefine each position on the screen (1024) almost five times.

400 The direction marker (D) is inserted in the first position of the mapped memory (15360). Note similar POKE statement in line 600.

410 - 650 **Complex logic of graphics mode.**

410 Scans keyboard until an entry is made. Stores keyboard entry in A\$.

420 Is A\$ a number? If it is, go to line 540, and expect two more numbers to designate graphics code. If not, continue.

430 Has A\$ been entered from the key labelled "left arrow"? If it is, go to next line (440). If D is already equal to 93, go to POKE statement at line 660. If A\$ is any other value, continue in logic tree at line 540.

440 The indicated direction is one step backwards so make direction increment variable (I!) equal to a -1, make the direction marker (D) equal to 93 and go to end of the loop.

450 - 500 Similar logic to lines 430, 440 for the right, up and down arrows.

510 If "9" was entered from keyboard, go to 590.

520 If "Shift/" was entered from keyboard, go to same routine at line 690.

530 If "/" was entered from keyboard go to alphanumeric mode at 950, otherwise go to the end of the loop.

540 - 550 Collect the other two digits of graphics code.

560 Concatenate graphics code digits and return the value. Store in E.

570 Check if E is in range 128 to 191, otherwise change E to 63. Symbol for 63 is "?" which will be printed on screen to designate graphics symbol has not been defined. This can be erased later by over-printing or a blank (128).

580 At this point, position of symbol is not defined, go to end of loop for next cycle.

590 G(I) is the image of the screen in memory and is saved for the taping routine. E is the symbol to be entered on the screen. I is the present position of the arrow on the screen. The symbol is placed in the correct location in memory.

600 The video screen map begins at location 15360. At this point the ASCII code of the appropriate direction arrow symbol resides at location 15360 + I and was placed there in line 400. The graphics symbol appears on the screen.

610 - 650 These statements update the screen position of the arrow, I is the present position of the symbol on the screen, I! is the most recent incremental change. Lines 610 to 640 check the four boundaries and make appropriate adjustments in I for "wrap-around". In line 650, the next screen position is computed by adding I! to I.

660 End of graphics loop.

670 An alternate termination if K should exceed 5000.

680 - 820 **The TAPE SAVE routine.**

690 - 700 Prompt for user to initialize tape recorder.

710 - 740 Initialization of G\$ occurs in line 710. The null string ("") of string variables is analogous to the zero of numeric variables. This initialization is necessary since G\$ is used as an adder in line 730. Actual packing of records occurs in line 730 by concatenation of string variables. Note that each new character is added to the end of the existing record. Thus, the entire screen image is preserved within the 16 variables of G\$. Each member of G\$ contains 64 characters in their proper order which were derived from the appropriate position within G.

750 Prompt for user to continue.

761 - 790 **This is the tape write routine.**

760 A FOR-NEXT loop with STEP variation. J assumes five values (0, 3, 6, 9, 12).

770 Three "rows" of G\$ are written each of the five times the program passes through this statement.

780 End of loop.

790 Since there are sixteen rows in G\$, the last row is printed separately. This division of labor was selected in order to avoid restrictions in record length in line 770.

800 - 820 Option to return to GRAPHICS MODE or EXIT is offered and tested.

830 - 940 **TAPE LOAD routine.**

830 - 850 Prompt for user to prepare tape recorder.

850 - 890 Tape read constructed according to tape write routine of lines 760 - 790.

900 - 930 A double loop. The outer loop index is L and ranges from 0 to 15; the inner loop index is M and ranges from 0 to 63.

910 G\$ is unpacked and restored in G.

920 The unpacked symbol is placed in video display memory and appears on screen. The POKE statement is similar to lines 400 and 600.

940 Return to GRAPHICS MODE

950 - 1070 **The ALPHANUMERIC MODE routine.**

960 Displays position arrow on screen. D never changes in alphanumeric Mode. See line 400.

970 Keyboard scan.

980 Places ASCII character of A\$ into E.

990 If CLEAR key was pressed, return to end of loop in GRAPHICS MODE after reinitializing E.

1000 Place ASCII code for alphanumeric character (E) in stored image of screen (G(I)).

1010 Enter code for alphanumeric character (G(I)) into video screen location (I * 15360). This turns on screen at location I. Compare to lines 960, 920, 800, 400.

1020 - 1060 "Wrap-around" and updating routine. The logic and construction is identical to lines 610 - 650.

1070 Reset A\$ to Alphanumeric Mode indicator and return to GRAPHICS Mode at line 530.

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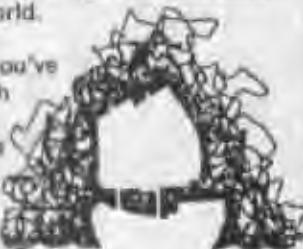
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SPECIAL BONUS

The following 16 pages contain a reprint of 80-NW, Vol I No 1. It is a photo copy of the original, so that all those badly spelled words are still there. Only a couple of advertisements have been changed (there were only 3!) to bring them more up to date.

At that time, we had no idea as to reaction to such a publication, so only about 500 copies of the first issue were printed. Lest all you hearty pioneers who ventured forth with us feel shorted, rest assured you also have the first issue free. Your subscriptions have been changed so that you get 7 for the price of 6. Lets say it is just our way of showing appreciation for your faith in 80-US.

You are probably wondering why the editorial page in issue 1 was signed "Irv". Let me explain: My full name is Irvin Mike Schmidt and I will answer to Irv, Mike or Hey-U.

"Andy" the Android was missing from that first issue, being no more

than a gleam in Leo C's eye. He came roaring in on the very next issue though, and has been a force ever since, as well as a trade-mark and mascot.

So we have come up a few degrees since then, even have people with degrees writing regular columns now. There are Dr. Livingston, Dr Bahn and Dr Pilgrim (yes! bet you didn't know that Phil Pilgrim has a PhD in Computer Science. But you have probably figured out that he is the driving force behind Discovery Bay Software.) Dr Bahn, starting with this issue, is our "Anatomy of the Program" Doctor (he also does post mortems). Me? Oh yes, I have a few degrees too, 98.6 as a matter of fact, from Fahrenheit. And, in response to many inquiries, I learned to be an editor by watching Lou Grant on TV.

There have been changes, and probably more to come. The addition of color to the cover in Jul-Aug 79 was a welcome change.

At any rate, for all of you who have requested Vol I No 1, here it is... Mike

EXCLUSIVE OR FUNCTION for Level I and II

Discovered by Robert A Hood, Bremerton, Washington

In addition to the + (for OR) and the * (for AND) logical operators, the - (minus sign) is also a logical operator which means "OR BUT NOT BOTH" (exclusive OR). This can easily be verified by using the short program which follows.

An exclusive OR is one in which any one (and only one) condition produces a true output. This is in contrast to the normal OR function, wherein any combination of input conditions may produce a true output.

```
10 INPUT"ENTER A & B";A,B
20 IF (A=1) - (B=2) THEN 100
30 PRINT:PRINT"A<>1 & B<>2 OR A=1 & B=2"
40 END
100 PRINT:PRINT"A=1 OR B=2 BUT NOT BOTH!"
```

Although the Level II BASIC Reference Manual mentions AND, OR and NOT as logical operators, this one ought to be just as useful.

It is interesting to note that when three arguments are presented (input A,B,C in line 10 and IF (A=1)-(B=2)-(C=3) THEN 100 in line 20), it acts as with two arguments except that when you input 1,2,3 it takes the "THEN 100" route.

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ELECTRIC PENCIL PATCH FOR NEWDOS

A Richard Miller, Miller Microcomputer Services

Two of the most popular independent software packages for the TRS-80 have been the Electric Pencil character-oriented word processing system by Michael Shrayer Software and NEWDOS, the independent and super TRS-80 disk operating system from APPARAT. At Miller Microcomputer Services, we use NEWDOS almost exclusively and the TRS-80 disk version of Electric pencil gets a heavy workout for writing, editing and printing reports, bills, advertising layout and lots more. We consider Apparat's SUPERZAP disk utility, available alone or on NEWDOS+, to be the ultimate TRS-80 "can-opener" - even better than a Swiss Army knife - so let's use it to match these two major software items.

Nearly all programs and files we have written in Radio Shack's own TRSDOS 2.1 are directly readable by NEWDOS. The only significant exception has been the Electric Pencil which has been almost, but not quite, normal when used with NEWDOS.

This is not a great problem because PENCIL is a stand-alone machine code program which runs just as well on TRSDOS 2.1 or 2.2 - if you don't need the optional keyboard debounce routine in NEWDOS and if you are willing to remember the otherwise obsoleted entry routines of 2.1 and 2.2. The only PENCIL routine we've had a complaint about on NEWDOS is a rather trivial issue - the automatic re-boot command, shift-O, doesn't go anywhere when it should have returned you to DOS. When you press the RESET button, you get that effect anyway.

But, for the NEWDOS purists out there, we're proud to pass along the latest, greatest patch for Electric Pencil to run under NEWDOS. Make a fresh disk copy of NEWDOS. (COPY .0 TO .1 MM/DD/YY, or equivalent), then COPY your regular Disk Electric Pencil file to it (COPY PENCIL|CMD:1 TO .0). Use the one-step NEWDOS entry to go into SUPERZAP, as follows: BASIC RUN-SUPERZAPIBAS (Enter). Enter a null (just press enter) to display disk, then answer 0, 11 and 2 in turn to display Drive C, Track 11 file (which is decimal 17, the Directory track), Sector 2.

Examine the ASCII code on the right side of your screen for the PENCIL|CMD filename. If it isn't in this sector, just

push the + key to increment size sector forward. Somewhere on sectors 2-8 you will find it. Good thing, too! We don't know where on the disk PENCIL landed when we did the COPY, so we're going to find its address in this "binary blob" file instead of hunting through the diskette's 256 sectors!

Now, note that PENCIL keeps information across two lines of the directory file. At the left, you will see columns of nearly identical location data, such as 0115A0, which translates to Drive 0, Track 11 hex, Sector 5, Byte number A0. The major portion of the screen is divided into "quads" of four hex digits each. These are actually pairs of two digit byte codes, slid together so the whole pack of information can be fit on the screen. On the right is a similarly distributed display of the same bytes in ASCII. If the code has an ASCII equivalent, the appropriate symbol is displayed; if not, a period is printed. You are the judge as to whether the equivalent ASCII code is tend or just garbage, which you can usually determine at a glance.

The screen, therefore, requires location information on the left, machine code for the 256 bytes in the disk sector (16 columns by 16 rows) in the center, and the same 256 bytes in ASCII on the right.

Now that you understand all that, let's read the directory. Runspec gives for PENCIL|CMD. Be sure that the first quad of machine code reads 1000; if it reads 0000 instead, you are looking at an obsolete PENCIL file which already has been killed! Go find another one, further along in the directory, and look at that.

Now that the first quad in the Pencil lines reads 1000 let's look at the fourth quad in its second row. Of its four digits, the first two tell you the track number on the disk on which the actual Pencil program starts. This number is in hex code, of course. The third digit of this quad is a coded clue as to the starting sector on that track; if it is a 0, the Pencil program starts on Sector 0, and if it is a 2, the program starts on Sector 8. Honest! We will need these numbers in a moment, so write them down now. An example might be that this fourth quad in the second row is 1C27. If so, Pencil will start at Track 1C, Sector 5. Got it?

Now, let's go to that first sector of the program. Just press the K key, and SUPERZAP will ask for the track number. Enter 1C, and when it asks for the sector number enter 5. In a moment, you will see the first sector of Electric Pencil displayed on the screen - confirm this by reading Pencil on the second line of the ASCII text. (Early version of SUPERZAP without the K-command won't work with Z, but you will have to enter the Drive number each time as well).

We are ready to patch the program so it will behave under NEWDOS. We are going to modify bytes AF through B1 in the first sector of the Pencil program. First, let's note what they are now. Find

the A row, beginning at A0, and read over to its right-most quad of machine code, bytes AE and AF, displaying values of F3 and 32, respectively. On the next line, byte B0 reads BB and B1 reads 4B, right? If we include the two adjacent bytes to these three which we will modify, the present code bytes AE through B2 is F32 BB4B C3.

Before we change anything, write it down! If you have a parallel output printer, use it and NEWDOS's marvelous "JCL" feature instead. Just press "JCL" all at once to get a full screen printout!

The patch itself is simple. Of these five bytes, we will change the middle three to zeros. You will have to type all of the following before anything new shows on the screen, so don't panic: MODAF. Once SUPERZAP hears that you want to modify starting at position AF it places an M for modify at the left of row A, and * to the left, as close as it can get to the AF.

The latter symbol indicates which position in the quad is being addressed. +,-,J in that order, so it is telling us that we are addressing the quad's 3rd digit. Watch the screen as you insert the changes: 000000, three pairs of zeros for the three bytes we want to change to zero. Make sure the F3 and C3 are still there, with all zeros between. If not, backspace with the left arrow key and rewrite. When it's correct, just hit Enter to write the modification to disk, and Enter again to see the final version. If you've got that printer hooked up, now is the time to hit JCL for the "after" record.

That's it - now wasn't that easy? If you're not sure, it will seem easy after a little more practice. A word of warning concerning SUPERZAP: mistakes are just as easy to make and maddening to spot later. So always work on a backup, not your only copy, and be sure to record the change on paper, including the adjacent code.

Now that you've got your new and fully compatible NEWDOS version of the Electric Pencil, you can KILL SUPERZAPBAS from the diskette. But first, if the spirit moves you, why not change the diskette name to PENCIL instead of NEWDOS? You will find the NEWDOS tree on the bottom of Track 11, Sector 0. Use the above technique to modify it to PENCIL. If you started with NEWDOS+, don't forget to change the + to a space, the ASCII code for which is 20. Now, KILL SUPERZAPBAS, plus the BASIC and many other system modules you won't be needing for PENCIL. See page 3 of your NEWDOS manual for a complete list of the appropriate files to kill.

Enjoy your PENCIL and NEWDOS. And, just wait until you discover the many other tricks you can play with SUPERZAP!

Editor's note: The Electric Pencil, NEWDOS, SUPERZAP and lots more are available from Miller Microcomputer Services, 61 Lake Shore Road, Natick, MA 01760 (508) 623-8138.

VIEW

FROM THE TOP

OF THE STACK

T. Rosenbaum
Technical Editor

Solutions to problems in last issue: The first was to build a subroutine which will put "n" (where n is between 0 and 255) characters on the screen. Assume that when the subroutine is CALLED, the operating registers contain the following information: A contains the ASCII character to be put on the screen. HL has the starting address of n characters in the video memory. B has the number of characters to be printed on the screen. Here is a solution:

```

SUBENT PUSH HL
        PUSH BC
        PUSH AF
LOOP    LD (HL),A; loads A to (HL)
        INC HL;next mem location
        DJNZ LOOP;do again if
                  BC<>0
        POP AF
        POP BC
        POP HL
        RET

```

The next project was to build a main program to use the above subroutine to print 15 "A"'s at 3C20, 137 "B"'s at 3C60 and 36 "Z"'s at 3E20. The solution:

```

LD A,041H ; ASCII A
LD B,00FH ; 15
LD HL,3C20H ; start address
CALL SUBENT
LD A,042H ; ASCII B
LD B,089H ; 137
LD HL,3C60H ; start address
CALL SUBENT
LD A,05AH ; ASCII Z
LD B,024H ; 36
LD HL,3E20H ; start address
CALL SUBENT

```

Note: Saving the A, B, H and L registers by pushing them onto the stack when you enter SUBENT is not necessary in the above program, since you don't care what happens to those registers in the subroutine.

"At, we were to predict what the following section of code will do:

ADDRESS

```

7000      CALL 7003
7003      CALL 7000

```

The contents of SP are 0000. At first blush, you would expect the program to get hung up, just looking back and forth between 7003H and 7000H. This is exactly what would happen if the code contained JUMPS instead of CALLS. Remember, every time you execute a CALL, the return address is PUSHed onto the stack. So, the stack will start growing downward as the CALLS are executed until the stack gets to 7003 when the routine will be destroyed by the stack and will bomb!

Now, on to a new area. I will now assume you are an unqualified expert on the care and use of the stack - ready to sally forth and conquer windmills with neat subroutines. But, before you don your armour, there is still more ground work to cover. The logical arithmetic, bit manipulation, shift and I/O instructions must be covered.

In order to understand the arithmetic operations, one must first learn the conventions for negative and positive numbers which the Z80 uses. The positive numbers are straightforward, but the negative numbers are a little tougher to figure out.

In most number systems subtraction can be performed by forming the complement (or inverse) of the subtrahend and adding it to the minuend. In the decimal number system the inverse is called the 10's complement and is formed by subtracting an n (continued on page 41) ==>>>

EXPERIENCE

David S. Rippinger, Osseo, MN

PROLOG

Every novice programmer can expect to taste the joy of a successful effort, and the bitter disappointment of an error which defies correction. Such is the case I am about to relate!

The joy came in finding a fine program in a hobby magazine, which has real value in the small business we operate. The program was a "Check Register Accounting System", published in PERSONAL COMPUTING magazine. Actually the "System" of programs consists of a series of a dozen programs which allow the user to input normal checking account data, and print out a wide variety of formatted reports.

Now, this novice is no dummy! The series was carefully studied to determine the dialect of BASIC used, and he was convinced that with the help of Dr. Lien's book "THE BASIC HANDBOOK" the programs could easily be written in TRS-80 Disk Basic.

THE EFFORT

After finishing the day's duties, the evenings were spent at the keyboard, happily converting the written page to magnetic memory. Every line was double checked. Every conversion of dialog was carefully documented with REMARKS and other pertinent notes. The structure of the program is such that each program "CALLS" another program in the chain from disk. After each program had been inspected and approved, the command was given to SAVE the program:

SAVE'CRAS-RS" was used to save the Routine Selection.

SAVE'CRAS-PAD" was used to save the Personal Account.

SAVE'CRAS-BAD" was used to save the Business Account etc.

Not trusting the fragile disk media, a backup copy was made of each disk.

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THE STING

Finally the dawn of doom arrived! Just as an evening session began, it was realized that this final evening of previously scheduled "free time" would produce the results, hopefully a perfect RUN! Before entering the last program it was decided to scan all the programs to search for errors with fresh eyes.

Command: LOAD"CRAS-RS"
RESPONSE: program not found
Command: CMD"S"
RESPONSE: DOS READY
Command: DIR:0
RESPONSE: DIRECTORY - DRIVE 0
CRAS

What? No program named CRAS-RS exists! A quick return to Basic and LOAD"CRAS" proved that the program was the last one entered from the keyboard.

THE REASON

As we all now know, the filename will truncate anything to the right of a non-alphanumeric

character, leaving only the left portion. In this case, each program was saved with the same prefix, hence each SAVE command actually destroyed the previous program by overwriting it!

THE FIX

It is now this programmer's practice to ALWAYS make a copy or two on Tape. But don't forget the CMD'T' & CMD'R' to stop and restart the clock.

THE RULE

The longer the program, the more precious the time, then the more valuable the "insurance" gained by making a tape copy of the program, regardless of the inconvenience of watching the tape counter click off those minutes!

Meantime, I am still back on page 1 on the CRAS program, and anxious to see it run. (Editors note: Mr Ripplinger stated he would like to correspond with anyone who has successfully done the CRAS program. He can be reached at "The Track of the Wolf Co.", PO Box Y, Osseo, Minnesota 55369/612 566-9200)

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TRS-80 IN EDUCATION

Cam Brown, Bellarmine Preparatory School,
Tacoma, WA

Our school has had a computer programming course based on microprocessors for the past five years. We have evolved from the Olivetti P602 to a Monroe 1880, and now, to 5 TRS-80 Level II machines.

We find the TRS-80 to be an excellent machine for high school instruction. The Level II version was chosen for a number of reasons: The language is more transferrable to other terminals which the students may use, the extended mathematical routines available and the editing features.

The computers are in constant use for about five hours each day. There have been no breakdowns. All cassette recorders have been modified so that the Hi-Lo switch acts as a remote plug, avoiding the need to plug and unplug cables.

During the past term, 100 students took Introductory Computer Programming and 10 took Advanced Programming. We feel that a student/machine ratio of 4/1 is best for a class. Currently we are working on a 6/1 ratio, which is too high. The introductory course lasts 13 weeks, and is designed as follows:

WEEK 1 - RUN, LIST, CLOAD, CSAVE, PRINT A,B
PRINTA; INPUT Variables, Strings

ASSIGNMENT - Print out a 4 X 4 Magic Square

WEEK 2 - GOTO LET Formulas and Equations

ASSIGNMENT - Compute slugging percentage or ERA

WEEK 3 - IF..THEN..ELSE..INT(X)..Divisibility tests..Reading flowcharts

ASSIGNMENT - Determine if a year is a leap year, compute the date of Easter

WEEK 4,5 - FOR..NEXT..STEP..Nested loops

ASSIGNMENT - Generates Pythagorean Triples, Prime numbers

WEEK 6,7 - READ..DATA..DIM

ASSIGNMENT - Sort a data list of numbers or words

WEEK 8 - GOSUB..RETURN..ON..GOTO..RND(X)

ASSIGNMENT - Rounding numbers

WEEK 9,10 - String tests and commands, CHR\$,ASCII Codes

ASSIGNMENT - Coding and decoding English phrases

WEEK 11 Video commands..SET..RESET..PRINT TAB..PRINT AT

ASSIGNMENT - Draw a picture

WEEK 12 - Social implications of the "Computer Revolution"

ASSIGNMENT - Opinion paper based on readings

WEEK 13 - REVIEW ASSIGNMENT - FINAL EXAM

This term (1979) we will use the book "Computer Programming in the BASIC Language", by Neil Golden. It is a paperback which is low priced and quite readable.

The computers have not been extensively used in other classes. Only those who teach programming make use of them. We do make use of tutorial programs in Chemistry, Statistics and Trigonometry. We find that 16K is necessary to develop good routines.

The advanced students work on an independent basis, but the topics covered usually include a more extensive use of string commands, machine language, number bases and detailed graphics. They are required to write programs which demonstrate the ideas they have investigated.

(Editors note: Cameron Brown is the Chairman of the Math Department at Bellarmine Prep, 2300 South Washington St. Tacoma, WA 98405. He is willing to discuss methods, problems etc., with other interested Educators. He can be reached at the above address or by calling (206) 752-7701)

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APPENDING STATEMENTS USING CLOAD

After doing a lot of programming, the BASIC programmer usually finds himself keying the same subroutines into different programs over and over. Wouldn't it be nice to write each one once, save them all in a cassette "library", and just load one or several into a program when needed? Unfortunately for Level II users, the CLOAD command doesn't allow for appending short sections of program into one long one. Instead, it wipes out the extant program, covering it up with the new one. Fortunately, there's a way to get around that limitation, as shown here.

Look at Figure 1. This shows how a Level II BASIC program is laid out in memory. Each statement is linked to the next with a pointer, a two-byte address telling where the next statement begins. There is also a *head pointer* (at 40A4) pointing to the beginning of the program, and a *tail pointer* (at 40F9) pointing to the end. By changing the head

pointer to point to the end of the program, Level II BASIC can be "fooled" into thinking there's no program there. In addition, any statements subsequently CLOADED will begin where the head pointer points, namely, after the end of the hidden or "covered" program. If, after loading these additional lines, the head pointer is restored to its original value, the old program "reappears" but with the new lines appended.

This is the technique used by the program listed in Figure 2. It links into the display calling sequence and is activated by PRINTing either CHR\$(1) or CHR\$(0). CHR\$(1) covers the current program and displays a graphic indicator in the upper-right corner of the screen. CHR\$(0) turns off the indicator and uncovers the program, leaving subsequently CLOADED code appended to it. **WARNING:** Make sure all line numbers in the appended statements are higher than the highest line number in the

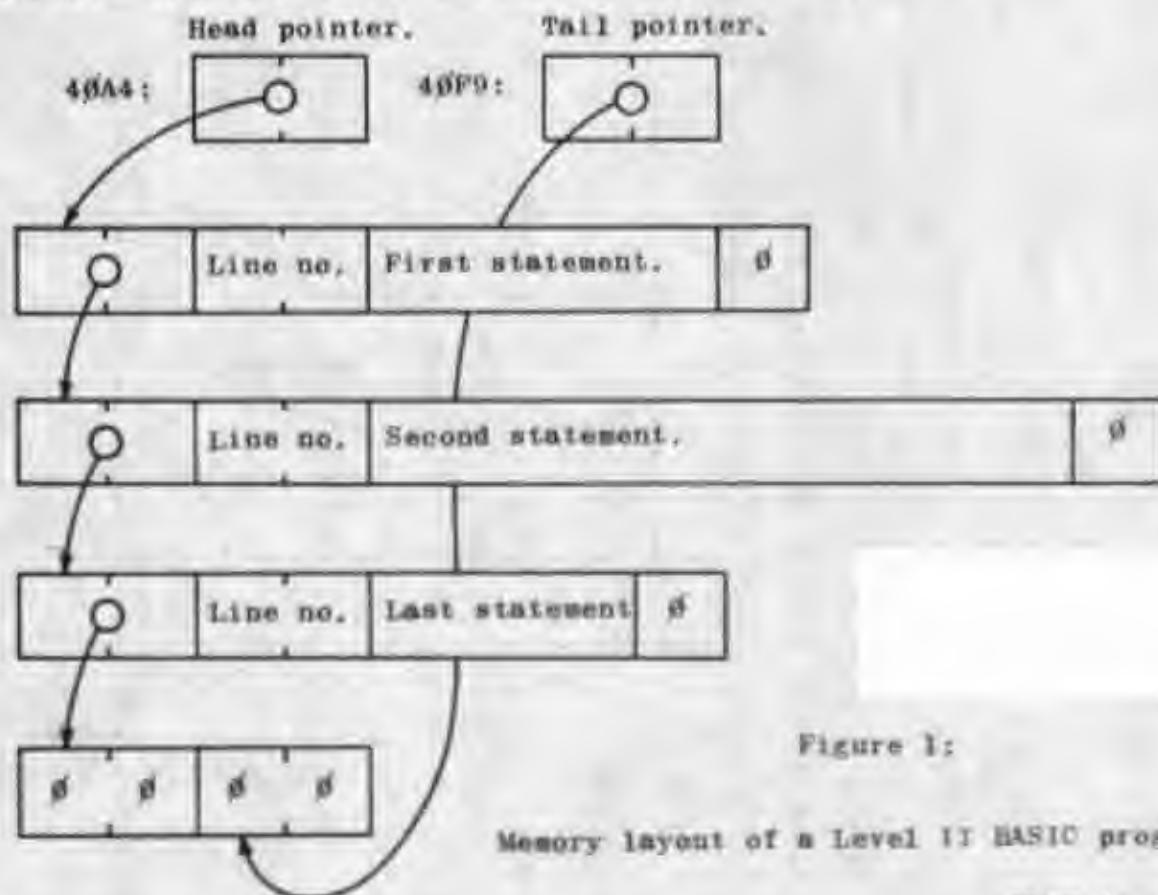
"covered" program, else anomalous behavior might result.

To use the program shown, enter it into the Editor/Assembler, assemble it, make a SYSTEM tape, and bring up BASIC. For MEMORY SIZE? enter 32000 (assuming a 16K machine). Load the SYSTEM tape and type !ENTER to execute the START block and run the program into the display calling sequence. The procedure for appending a tape to the current program is this:

```
PRINT CHR$(1)  
CLOAD  
PRINT CHR$(0)
```

This can be repeated as often as necessary for each program segment you want appended. Happy concatenating!

—Phil



	ORG	7F9DH	;MEM SZ 32689
START	LD	HL,(401EH)	;Link into display.
	LD	(SDSPLY+1),HL	:
	LD	HL,RDSPLY	:
	LD	(401EH),HL	:
	JP	1A19H	;Back to BASIC.
RDSPLY	PUSH	AF	;Save A and flags.
	LD	A,I	;Chr. is in C.
	CP	C	;Compare w/ 1
	JR	Z,CVR	;=1: Cover program.
	JR	NC,UNCVR	;=0: Uncover program.
	POP	AF	Regular character.
SDSPLY	CALL	\$-\$;Call display routine.
	PUSH	AF	;Save AF again.
	LD	A,(FLAG)	;Get "covered" flag.
	OR	A	;Zero?
	JR	Z,RETURN	;Yes: Return.
	LD	(3C3FH),A	;Put block in URH corner.
	JR	RETURN	;Return.
CVR	LD	A,(FLAG)	;Get "covered" flag.
	OR	A	;Already covered?
	JR	NZ,RETURN	;Yes: Return.
	PUSH	HL	;Save HL.
	LD	HL,(40A4H)	;Get head pointer.
	LD	(BSAVE),HL	;Save it.
	LD	HL,(40F9H)	;Get tail pointer.
	DEC	HL	;Subtract two.
	DEC	HL	:
	LD	(40A4H),HL	;Put in head pointer.
	POP	HL	;Restore HL.
	LD	A,131	;Get graphic block.
	LD	(FLAG),A	;Set "covered" flag.
	LD	(3C3FH),A	;Put it on screen.
	JR	RETURN	;Return.
UNCVR	LD	A,(FLAG)	;Get "covered" flag.
	OR	A	;Covered?
	JR	Z,RETURN	;No: Return.
	PUSH	HL	;Save HL.
	LD	HL,(BSAVE)	;Get old head pointer.
	LD	(40A4H),HL	;Put it back.
	POP	HL	;Restore HL.
	XOR	A	;Reset "covered" flag.
	LD	(FLAG),A	:
	LD	A,' '	;Get a blank.
	LD	(3C3FH),A	;Remove block from scrn.
RETURN	POP	AF	;Restore A and flags.
	RET		;Return.
FLAG	DEFB	0	;"Covered" flag.
BSAVE	DEFS	2	;Save area for head ptr.
	END	START	;Autostarts @ START.

Figure 2: Source listing for append program.

HOW THE LEVEL II INTERPRETER SEES IT

Dick Straw

Down at the end of appendix C/2 in your Level II BASIC Reference Manual you will discover the information that ASCII codes 129 through 191 are graphics codes, and ASCII 192 through 255 are tab codes. And they are. If you run something like

PRINT CHRS(270) CHRS(10)

you will get a graphic block set spaced appropriately eight spaces from the left margin of your screen. Actually, 128 is a graphics code too - it just doesn't have any of the six segments of the graphics matrix set, so it comes out black.

But that only tells part of the story, because those same 128 code values are used by the interpreter as spacesaving symbols equivalent to that list of reserved words on page A/15 of the appendix in the manual. Here's how it works—and how to see it for yourself.

When you start typing a line on your keyboard in the usual fashion, each keystroke is duly recorded in the I/O buffer as its ASCII code equivalent. When you push ENTER at the end of the line, the line you just typed is interpreted right on the spot - in the buffer. Each of the command or instruction words is converted to a single byte equivalent, with values between 128 and 255, inclusive. If there was no number at the beginning of the line, the instructions you just entered will be acted upon at once. If there was a line number, the whole line is transferred to the text memory location and put into its proper place.

Both of those locations can be examined using the PEEK command. The I/O buffer occupies 256 locations beginning at 16870, while the text memory starts at 17129 if you have no disk BASIC entered. I don't have a printer or a disc, so it takes a lot of staring at the screen, but no big hazards.

Try this: write a short program, say, three lines or so. For example:

```
10 DEFINT A,L :DIM A(9)  
20 FOR L = 0 TO 9: A(L)=5*L+2  
30 PRINT A(L):NEXTL
```

Then run it. You get the line of ten numbers you expected. Now in command mode enter:

FORZ = 0TO200-?PEEK(17129 + Z)-NEXTZ

I got a string of numbers like the following – you should too, if you used the same spacing I did. I will mark some places as I type this, in order to refer to them later, so remember that the underlining and the letters don't come with the output.

Most of the numbers here are simply the ASCII codes for the individual letters and numbers used in the program — and the punctuation, too, of course. If you look them up in appendix C, you will find, for example, that 32 is a space and 58 a colon.

First of all, remember that the program had three lines, numbered 10, 20, and 30. We can see those line numbers in the parts of the text

marked B. It is easy to see them if you use line numbers below 256, because the numbers are entered in the usual manner for recording integers, with the least significant byte (LSB) first and the most significant byte (MSB) next, in two bytes. For low numbers, the MSB is zero and the LSB comes out as its real number. For higher numbers, you need to multiply the MSB by 256 and add the LSB to see what you have.

The two numbers ahead of the line numbers are marked B. These, in the same integer format, are the pointers to the next line of the program in the text memory. For example, 252 66 translates to 17148. Since the location of the first number, 252, is 17129, we count over until we reach 17148 and find a 24, the first byte of the pointer to the third line. The pointer at the beginning of the third line points to a pair of zeroes, marked with an M – this means there is no next line, so the line we were in, in this case line 30, is the last in the program. Since every line of the program ends with a zero (marked E, above) you can locate not only the end of each line but the end of the program as well.

All those other big numbers in the program itself are the function codes I referred to earlier, and you can translate them either by comparison with the program itself or by looking them up in the table of function codes listed there. The first, for example, is 153, the equivalent of DEFINT.

Following the program itself you will find all the variables that were assigned values in the program (that is why it was worth while to run it before the PEEK). You need to know that every variable has a three-byte "name" that precedes each value itself. The first byte is a digit that both defines the type of variable and tells how many value-bytes there are. For example, the sequence 2 0 76, marked "L", is the name of the integer variable L used as an index. The 2 tells you it is stored in two bytes. The next byte is the second symbol in the name, here a zero because we didn't use a second symbol. It would be 49, the ASCII value of 1 if we had called the variable L1. The MSB of the name is 76, which is ASCII "L".

The next one is something of a surprise at first. It starts out 4 0 90 – 4 is a single precision variable that needs four bytes for the value, and the name is Z – the variable used in the command line to print out the peek was put in here, shoving the other variables aside. If a double precision variable were used, its indicator would be an 8. After the Z value (the value it had when the printing command passed it up), we find the array, A. Its name is that of an integer, but the next values are descriptions of the array – two bytes for the length of the storage string (after the MSB of its value), one byte for the number of dimensions (here 1), and two bytes for the number of locations in each dimension. There is only one dimension here, with ten locations (0 to 9). Then come the ten values, two bytes each.

String arrays have a header beginning with 3, meaning three bytes are in storage. Those three bytes are not its value, obviously, but indicate the length of the string in the first byte (thus a limit of 256 characters), and the integer-format location of the first character in the string. If you assign the string value in the program, as in a print statement, the location pointed to will be in the program text. If it is a string whose value is assigned as a variable, it will be found at the end of the RAM memory.

So there is your whole program, laid out in the memory of your processor for the interpreter to read. And you can read it too. I have included the Hex values for the function codes in the table so that those who get a Hex dump say, from the RSM-1S monitor, can translate it also. Those masochists will also need to translate the ASCII values of letters and numbers from and into Hex, of course!

It is also interesting to look at the I/O buffer. If you type in a long command string, such as the PEEK routine we used to look at the text memory, you will discover that the little program is still there. The first parts of it will be written over as the line is shortened by conversion of the functions to their one-byte codes, and will end with three zeroes, but after that you can find the key-by-key entries you put in when typing.

You can also try this: with your program in residence and after a PEEK, as we did before, enter NEW, then run the PEEK on the same area again. You will find that the first two numbers are zeroes – meaning, sorry, no program. You will also find the variable you used to PEEK written in there too. But after that, the rest of the program will be in its original form. You can POKE the original numbers back into locations 17129 and 17130 and list the program again, with only the loss of the first line (if it was long enough not to be overwritten in your playing around).

You can figure out what most of the numbers between 128 and 255 mean by PEEKing at them just as described. But a lot of those numbers don't mean anything unless you have disc basic. You can still see what they mean if you try the following:

Enter a short program, say, two lines, like this:

```
10 A = 10  
20 PRINT A
```

You know that the text will be located beginning at location 17129, with the first four bytes devoted to the pointer and line number. So POKE into 17133 (the first byte of the program itself) and maybe a couple of others – but be sure not to get past the end of the line, and then LIST the program. Line 10 will be there, and so will the meanings of the numbers you POKEd in. Most of them won't run, of course, unless you have disc running, but the listing will still do the translating for you.

TRS-80 LEVEL II FUNCTION CODES

DEC	HEX	MEANING	170	AA	KILL	213	D5	=
128	80	END	171	AB	LSET	214	D6	<
129	81	FOR	172	AC	RSET	215	D7	SGN
130	82	RESET	173	AD	SAVE	216	D8	INT
131	83	SET	174	AE	SYSTEM	217	D9	ABS
132	84	CLS	175	AF	LPRINT	218	DA	FRE
133	85	CMD	176	B0	DEF	219	DB	INP
134	86	RANDOM	177	B1	POKE	220	DC	POS
135	87	NEXT	178	B2	PRINT	221	DD	SQR
136	88	DATA	179	B3	CONT	222	DE	RND
137	89	INPUT	180	B4	LIST	223	DF	LOG
138	8A	DIM	181	B5	LLIST	224	E0	EXP
139	8B	READ	182	B6	DELETE	225	E1	COS
140	8C	LET	183	B7	AUTO	226	E2	SIN
141	8D	GOTO	184	B8	CLEAR	227	E3	TAN
142	8E	RUN	185	B9	CLOAD	228	E4	ATN
143	8F	IF	186	BA	CSAVE	229	E5	PEEK
144	90	RESTORE	187	BB	NEW	230	E6	CVI
145	91	GOSUB	188	BC	TAB(231	E7	CVS
146	92	RETURN	189	BD	TO	232	E8	CVD
147	93	REM	190	BE	FN	233	E9	EOF
148	94	STOP	191	BF	USING	234	EA	LOC
149	95	ELSE	192	C0	VARPTR	235	EB	LOF
150	96	TRON	193	C1	USR	236	EC	MKI\$
151	97	TROFF	194	C2	ERL	237	ED	MKS\$
152	98	DEFSTR	195	C3	ERR	238	EE	MKD\$
153	99	DEFINT	196	C4	STRING\$	239	EF	CINT
154	9A	DEFSNG	197	C5	INSTR	240	F0	CSNG
155	9B	DEFDBL	198	C6	POINT	241	F1	DCBL
156	9C	LINE	199	C7	TIME\$	242	F2	FLX
157	9D	EDIT	200	C8	MEM	243	F3	LEN
158	9E	ERROR	201	C9	INKEY\$	244	F4	STR\$
159	9F	RESUME	202	CA	THEN	245	F5	VAL
160	A0	OUT	203	CB	NOT	246	F6	ASC
161	A1	ON	204	CC	STEP	247	F7	CHR\$
162	A2	OPEN	205	CD	+	248	F8	LEFT\$
163	A3	FIELD	206	CE	-	249	F9	RIGHT\$
164	A4	GET	207	CF	*	250	FA	MID\$
165	A5	PUT	208	D0	/	251	FB	
166	A6	CLOSE	209	D1	↑	252	PC	
167	A7	LOAD	210	D2	AND	253	FD	
168	A8	MERGE	211	D3	OR	254	FE	
169	A9	NAME	212	D4	>	255	FP	ISA

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VIEW- (continued from page 31)
digit number from 10ⁿ. Example:

100	10000	
44	7638	
56	2362	<- 10's Complement

Now suppose you want to perform the subtractions:

55	9747	5000
-44	-7638	7638

Instead of using the conventional borrow-subtract method, let's add the 10's complement.

55	9747	5000
+56	2362	2362
111	12109	7362
-100	-10000	
11	2109	

In the first two cases, the most significant digit (MSD) is a one and must be dropped to account for the 10 borrowed in the complementing process. In the third case the minuend was smaller than the subtrahend so the result is negative, indicated by the lack of a one in the MSD position. In order to find the correct answer the sum must be complemented and a negative sign assigned to the answer.

10000
7362
2638

So, -2638 is the correct answer. You may say that this is all fine and good, but how does it help understand Z80 machine language? Well, it just so happens that the Z80 uses 2's complement numbers as negative numbers. You only get three guesses (and the first two don't count) on how to form the 2's complement of a binary number. The 2's complement of a binary number is formed by subtracting the n bit number from 2ⁿ.

100000	1000000	2 ⁶
10110	111011	
01010	000101	2's compl

(continued on page 43) >>>

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Business Computing

John Strader, CPA

Database Management

We all probably have several programs to do some kind of business application. Some are our own, while others may be adaptations of other programs. Each in its own way may be just the thing for a certain job, but as time goes on you probably find yourself typing the same or similar information into more than just one of those programs.

One of the answers to this proliferation of various and sundry programs is a Database. A database is simply a file containing ALL the information you will need. In addition to name, address, city, state and zip code, you may have information concerning date, purchase order number, total dollar value of goods, expiration dates etc.

A program is necessary to create this Database, and to do various things to it such as sort, make additions and deletions, and corrections. The idea being that once the information is entered into the database, it need never be entered again.

After the Database is created, other utility programs are created, each of which will access the database for some particular purpose, but all will use the same data file, or database. For example, one utility may access the file to search out and print selected names for a mailing list, while another utility program may access the same file to summarize total business of a certain product in a given time period.

The number of utility programs accessing the database is not limited by the memory in your system, since only one such utility is in memory at any one time. Any time that a new report is required another utility may be written to retrieve the information from the database. The utility can then format the output into any desired report form.

An interesting aspect of the database is that much of the information contained in it need not be totally spelled out. In other words, price information need not be entered as so many dollars and cents, but rather as a single digit in a given place. The accessing utility then can read that digit and translate it back into the appropriate dollars and cents. This saves storage space on disk and allows the storage of more information on the disk file.

A database manager is a program which allows you to set up files and reports, by specifying parameters instead of actually programming the com-

puter. The manager is a program which takes care of opening the random file and fielding the various variables. The database manager will handle these functions and make them invisible to the user.

One such database manager is the RADEX 10, produced by the International Jewelry Guard Inc., 588 North Mountain Ave., Suite B, Upland, California 91766. This program asks you questions in plain English. The first statement asks for a file name. Then it asks you to define the fields of your file and asks for the headings and number of characters for each of the fields so that it can create your record. It will allow you to build your own personal mailing program without doing any programming just by defining your file and reports. After you have defined the file, the entry module automatically sets up input menus to enter the data from your keyboard.

Next you proceed to the report creation-output portion of the database manager and create the type of report you want. For instance, you could have the report section generate mailing labels, or you could have it list all names and addresses in your file, or you could do both.

The manual accompanying the RADEX 10 is over thirty pages. It defines programming terms used in the data base manual and system. It also tells how the system works in some detail. The program has a lot of flexibility. Minimum record size is 2 characters, maximum is 255. The minimum number of fields per record is 2, the maximum is 127. The maximum number of switches in a report is 31.

The portion of RADEX 10 which we reviewed allows the creation of files and the output formatting of reports from those files. Some of the additional add-ons in planning are a Super Search, a Change Report, an Applications Interface, Report Program Generators, an Electric Pencil Linker and Input/Out Tables, among others. The portion which we reviewed was flexible and worked as advertised. The documentation was good.

The database management system definitely saves time, reduces effort and requires a minimum amount of programming expertise in developing simple programs or routines for business or personal use.

A NOTE ON BASIC

Here are some more calls to Level II ROM routines that are useful to assembly language programmers and for USA routines:

28A7

prints an text pointed to by the HL register up to a X'00' or X'D'

01C9

clears the screen and homes the cursor

0049

accepts a character from the keyboard it puts the character in the A register and uses both the AF and DE registers

0028

accepts a character from the keyboard but doesn't wait (SHKETS). C is returned if nothing is pressed

0040

accepts a line of input from the keyboard, terminated by a BREAK or ENTER. All keyboard functions are recognized. To call, put the address of the input buffer in the HL register and the maximum number of characters to be input in the B register. On exit, B will have the number of characters actually input and flag C will be set if the terminator was a BREAK. Registers AF and DE are used by the routine.

00FC

starts system initialization where "RADIO SHACK LEVEL II" is printed

00B5

prints the MEMORY SIZE text and waits for response

0075

the jump point for Level II if in DOS

400C

a 'Break' vector normally, this can be changed to a 3 byte instruction to enter a routine of your own by hitting the 'BREAK' key

02b2

prints "?" and allows entry as with the SYSTEM command

1A19

normal entry point for a READY

003B

outputs a byte to the line printer from the A register. Z is set on exit if ready. Uses AF and DE

Note that in using these, not all may work as expected with a DOS system. Individual users should try them to see.

The procedures for subtracting numbers is directly analogous to the 10's complement method for decimal numbers. A simple method of obtaining the 2's complement is to invert each bit and add one to the result. For the preceding example:

10110	111011
01001	000100 compl each bit
00001	000001 add 1
01010	000101 2's Compl

Let's use the 2's complement to perform the subtraction given below. The process used will be a direct parallel to the 10's complement process explained earlier.

110101	100111	001011
111001	000101	101111

First, get the 2's complement of the minuend and add.

110101	100111	001011
000111	111011	010001
0111100	1100010	0011100

The first and third sums have a zero in the seventh bit position which means the result is negative. In order to get the correct answer the 2's complement of these two sums must be taken and a minus sign assigned to the result to get the correct answer.

000011	1000011
+ 1	+ 1
-000100	100010 -100100

The results of Z80 arithmetic operations are given in 2's complement. Knowing this, it is helpful to know the decimal equivalent of all the possible values a one byte signed binary number can take. The following table gives these values:

HEX	DECIMAL	HEX	DECIMAL
FF	-1	7F	+127
FE	-2	7E	+126
.	.	.	.
81	-127	01	+1
80	-128	00	0

Some method of telling the sign (+ or -) of a signed number must be used. The convention which the Z80 uses is to assign the MSB as the sign bit. A zero means plus, a one means minus. If the number is negative, it is in 2's complement form, which means you must take the 2's complement of the number to find its true value. For example, the value of 1000 0000 is not -0. The one in the MSB means the number is negative, and the true value of the number is found by taking the 2's complement. The correct answer is -128. Armed with the foregoing information, can you now figure out why the Level II logical TRUE is -1 instead of 1? The hex value of -1 is FF, or binary 1111 1111 all of the bits on as opposed to the FALSE state which is 0, all the bits off.

In the following text the parameter s will be referred to in the operand field of an op code, such as ADD A,s. The use of s is shorthand to indicate that s may be any of the following:

1. r - any of the registers A,B,C,D,E,H,L
2. n - one hex byte
3. (HL) - the contents of the memory location whose address is contained in the HL register pair.
4. (IX+d) - the contents of the memory location whose address is the value of the IX register plus d (-128 < d < +127)
5. (IY+d) - similar to 4 above. The shorthand notation ss will refer to any of the register pairs BC, DE, HL, SP.

(View will continue next issue with further discussion of the index registers, the arithmetic instructions (both 8 bit and 16 bit) and further projects for us to work on. Address any inquiries to VIEW, PO Box 7112, Tacoma, WA 98407)

STOCK PROGRAM

Part 2 - STOCK YIELD

Stock Yield is a handy tool, even though it will not be used as much as Stock Pro. At least once per month you can input current market prices, along with newly acquired shares, to keep on top of things. Definitely, Stock Yield is a factor in deciding whether to sell or to hold.

The format of Stock Yield is quite similar to that of Stock Pro. Again, each stock is automatically numbered, and it might be well to keep your previous printout handy when changing specific stocks.

This program too, begins by requesting date information, as each printout should be dated to facilitate comparisons.

Be sure to answer the "How many files?" question with 15 when loading this program. The option table asks "What do you want to do?"

(DOS and Printer required)

The Second of a Three part series

Fred Gutz & John Knoderer
St. Louis, MO

In the first of this series, last issue, we examined a program used to keep a current inventory of any set of stocks. That program was named "STOCK PRO".

1. Add a stock
2. Change a listing
3. Change all market prices
4. Print out a complete listing
5. Delete a stock
6. Quit the program

The program will automatically open a random file named "FILE 20". To insert a stock, start with option 1. Each time a stock is properly listed the program will refer you back to the option table.

Any part of any listing may be changed using option 2. You may simply step through those items which need not be changed until you get to the one you need to change. See line 280 of the program.

Four items must be typed in for each stock. First, the name of the stock (9

character max), then the unit cost price, the market price and finally the dividend per share for the past year. The program takes over in the printout giving you the percent of return, based on your cost, and finally, the percent of return based on the current market price.

Stock Yield provides you with a quick analysis, showing all the returns of your various holdings. Some will surprise you. It may seem like your favorites might be paying more when actually they are paying less! Only the comparative figures will prove it.

Next issue, we will present the last of this threesome, SELL/TAX. It takes into account your income tax bracket, the broker fees, and tells you what you actually will net when selling a stock.

NOTE: THE AUTHOR USES LONG LINES. TO FIT THIS PROGRAM ON OUR PAGE WE HAVE HAD TO INSERT LINE FEEDS (DOWN ARROW). IN TYPING THIS PROGRAM DO NOT USE LINE FEED EXCEPT IN LINE 110.

```
10 REM * FILENAME IS -STKYIELD--YIELDS OF STOCKS
20 REM * (C) 1979 JOHN KNODERER, ST LOUIS, MO *
30 REM * PERCENTAGE RETURNS ON STOCKS
40 REM * TOTAL YRLY. DIVIDENDS DIVIDED BY COSTS
50 REM * TOTAL YRLY. DIVIDENDS DIVIDED BY MARKET PRICES.
60 IFLEFT$(TIME$, 2)>"00" THEN 100 ELSE INPUT "MONTH OF THIS REPORT";
   M: IFM<10>M12 THEN 60 ELSE POKE 16454, M
70 INPUT "DAY"; D: IFD<10>31 THEN 70 ELSE POKE 16453, D
80 INPUT "YEAR"; Y: IFY>1900 THEN Y=1900
90 IFY<00>255 THEN 80 ELSE POKE 16452, Y
100 CLEAR999: DEFDDBLA-H, K-2: OPEN "R", 1, "FILE20"
110 INPUT "WHAT DO YOU WANT TO DO?
      1. ADD A STOCK TO THE LIST
      2. CHANGE A LISTING
      3. CHANGE ALL MARKET PRICES
      4. PRINT OUT A COMPLETE LIST
      5. DELETE A STOCK
      6. QUIT THE PROGRAM
      CHOOSE":A
120 ONAGOTO130, 290, 300, 340, 430, 450: GOTO110
130 GET1, LOF(1): QC=-1
140 QC=QC+1: IFQC=17 THEN FIELD1, 255 ASA1$: LSETA1$=STRING$(255, 0):
   PUT1, LOF(1)+1: QC=0
150 GOSUB460: IFN1$<>STRING$(9, 0) THEN 140
160 N$="" : U=-9: M=-9: D=-9: I=LOF(1)
170 IPN$<>"" THEN PRINTN$,
180 INPUT "NAME OF STOCK"; N$: IFN$="" THEN 180
190 IPU>=0 THEN PRINT USING "###.##"; U,
200 INPUT "UNIT COST OF STOCK"; U: IPU<0 OR U>300 THEN 220
```

```

210 IFM>=0THENPRINTUSING"##.##";M,
220 INPUT"MARKET PRICE IS -";M:IFM<0ORM>300THEN220
230 IFD>=0THENPRINTUSING"##.##";D,
240 INPUT"DIVIDENDS FOR ENTIRE YEAR";D:IFD<0ORD>300THEN240
250 N$=LEFT$(N$, 9):CLS:PRINT"STOCK NAME", N$:PRINTUSING"UNIT COST
    $$#.##";U:PRINTUSING"MARKET PRICE $$##.##";M:PRINTUSING
    "DIVIDEND FOR YEAR $$##.##";D
260 A$="" : INPUT"DO YOU WANT TO MAKE ANY CORRECTIONS IN THE ABOVE";
    A$:A$=LEFT$(A$, 1):IFA$="Y"THEN PRINT "AS THE CURRENT MARKET
    VALUES ARE DISPLAYED, MAKE THE CORRECTIONS. IF YOU WANT TO
    KEEP THE VALUE, PRESS ENTER":GOTO170
270 IFA$<>"N"THEN 260
280 LSETN1$=N$:LSETU1$=MKI$(U*100):LSETM1$=MKI$(M*100):
    LSETD1$=MKI$(D*100):PUT1,I:GOTO110
290 INPUT"WHICH STOCK DO YOU WISH TO CHANGE ##";J:I=INT((J-1)/17)+1
    :QC=J+16-I*17:GET1,I:GOSUB460:N$=N1$:U=CVI(U1$)/100:
    D=CVI(D1$)/100:M=CVI(M1$)/100:GOTO250
300 CLS:PRINT"AS THE STOCKS ARE DISPLAYED, ENTER THE CURRENT
    MARKET PRICES":FOR I=1TOLOF(1):GET1,I:FORJ=0TO16:QC=J:
    GOSUB460:IFN1$=STRING$(9,0)ORN1$=STRING$(9,32)THEN330
310 M1=CVI(M1$)/100:PRINTN1$" UNIT$"CVI(U1$)/100"OLD
    MARKET$"M!;:INPUT"NEW MARKET";M!
320 LSETM1$=MKI$(M1*100+.1)
330 NEXTJ:PUT1,I:NEXTI:GOTO110
340 LPRINT"VALUES AND YIELDS AS OF ";LEFT$(TIME$, 8):LPRINT" "
350 LPRINT"ST NAME OF      UNIT      MARKET      DIVIDEND      %RE
    TURN      %RETURN"
360 LPRINT"## STOCK      COST      PRICE      FOR YEAR      ON
    COST      ON MKT.":LPRINT" "
370 FORI=1TOLOF(1):GET1,I:FORJ=0TO16:QC=J:GOSUB460:
    IFN1$=STRING$(9,0)ORN1$=STRING$(9,32)THEN400
380 U=CVI(U1$)/100:M=CVI(M1$)/100:D=CVI(D1$)/100
390 LPRINTUSING"##  #  #  #  #  #  #  #  #  #  #  #  #  #  #  #  #  #  #
    .##  ##.##";I*17+J-16,N1$,U,M,D,100*D/U+.001,100*D/M+.001
400 NEXTJ,I
410 FORI=1TO12:LPRINT" ":NEXT:GOTO110
420 END
430 INPUT"WHICH STOCK DO YOU WANT TO DELETE ##";J:I=INT((J-1)
    /17)+1:QC=J+16-I*17:GET1,I:GOSUB460:PRINT"DO YOU WANT TO
    DELETE";N1$:INPUTA$:A$=LEFT$(A$, 1):IFA$="Y"THENLSETN1$=
    STRING$(9,32):PUT1,I:PRINT"STOCK DELETED.":GOTO110
440 PRINT"STOCK NOT DELETED.":GOTO110
450 CLOSE:PRINT"GOOD MORNING!":END
460 FIELD1,QC*15ASA1$,9ASN1$,2ASU1$,2ASM1$,2ASD1$:RETURN

```

VALUES AND YIELDS AS OF 04/29/79

ST ##	NAME OF STOCK	UNIT COST	MARKET PRICE	DIVIDEND FOR YEAR	%RETURN ON COST	%RETURN ON MKT.
1	AM AIRL	\$ 9.57	\$ 13.25	\$ 0.40	4.18	3.02
2	AM BRAN	\$ 18.80	\$ 48.15	\$ 2.98	15.85	6.19
3	A E P	\$ 11.91	\$ 21.25	\$ 1.99	16.71	9.37
4	ANH BUS	\$ 2.18	\$ 25.25	\$ 0.90	41.29	3.57
5	H&R BLOC	\$ 9.35	\$ 10.75	\$ 0.80	8.56	7.44

Figure 1



Software Provided by FoxGlove

ADVENTURE

Adventure is an incredibly complex, detailed and fascinating game. Unlike most available games, there is always a surprise around the corner. Winning is quite a challenge, consequently, each step closer to winning gives one a fulfilling sense of accomplishment.

In Adventure, one takes the computer through an area, leaves, islands and looking for treasure. You move, manipulate objects, and do everything else with the built-in English commands. For example: TAKE AXE; LIGHT TORCH. One finds out what commands work by trying whatever sounds sensible.

The program gives you a description of where you are and what you are. Then you tell the computer what to do.

Getting treasure is difficult. Often, one must use several other objects to even find the treasure. You need to solve the series of problems posed by the obstacles by using common sense, and by making choices from observations.

Adventure 1 and Adventure 2 by Scott Adams (Box 3436, Longwood, Florida 32750 - \$14.95 each) are superb. In Adventure 1 you wander through forests and caverns finding treasures. In Adventure 2, you become a pirate and sail off to Treasure Island. More adventures are currently in the making.

Some useful advice may help speed your understanding of the game. To move in a direction, (north, up, etc) just type the first letter of that direction (N,E,S,W,U,D). To enter places, you must often use ENTER (as for example, ENTER HALLWAY). This command is essential to getting around.

TAKE and **DROP** are used to manipulate objects. **INVEN** gives you an inventory of all that you are carrying. **LOOK**, followed by an object, will sometimes help you discover secrets.

about that object. HELP will sometimes give you useful hints.

The program only looks at the first three letters of each word. Once you understand the program, all you need to type are the first three letters. This short-cut in the program can sometimes confuse a player, as one time we were saying TAKE BRANCHES (in hopes there were some around), but the program understood it as saying TAKE BRACELET.

The program allows you to save a game in progress with the command **SAVE GAME**. This prepares a data tape which can be read back later, a handy feature, since winning can take some time.

Adventure 1 has a beautiful display. At the top, everything that you can see is constantly displayed. Below this is a line of dashes, and the remainder of the screen is devoted to input. When typing commands, the bottom of the screen scrolls up, but only to the dashes. Material scrolling into the dashes disappears. It also features a flashing cursor.

Adventure 2, probably due to lack of memory, does not have either feature. The program seems to contain a minor bug in a routine clearing with stamps, but this is merely perplexing, not a disaster.

Both programs import lower case, so if your system does too, you can read in uppercase data. Both programs are written in machine language and load under the SYSTEM command.

If you dislike being made to think, or if you get frustrated easily, forget these programs. But if you love a challenge, like to be baffled, and enjoy jokes (there are some very funny occurrences), I highly recommend these programs. By Scott Adams.

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John B. Edwards spent his working life in the coal-mining industry. He is a past board member of the United Mineworkers of America and a former coal miner. He is President of the John B. Edwards Foundation, a non-profit organization that funds research projects related to the prevention and treatment of lung diseases.

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2045 Journal Sept/Oct 79



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TRS-80 Systems



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FULL SCREEN PRINTING IS EASY!

Robert Labenski, West Hartford, CT

Have you just upgraded your system to include a line printer? Are you avoiding the effort to convert or modify all of your programs to use it? Remember the time it took to get that nifty screen layout? Don't despair, there is an easy solution.

That solution is presented here, and is based on the fact that the TRS-80 video regeneration is done from memory. It is mapped to locations 15360 to 16383. Each memory location has a corresponding position on the display screen. The Level II Manual suggests using POKE instructions to speed up graphics but does not go into much detail.

This design is quite straight forward. Consider this memory as simply an extension of your programmable memory. Therefore, by using PEEKs and POKEs, any program can read the content of the screen and modify it.

The following routine does just that. It can be added as a subroutine to any existing program and be used to print the entire content of the screen to the printer on demand.

STATEMENT COMMENT

```

10000 Reserve space for strings and use
      interspersed for speed.
10010 to 90 Select each line to print.
10020 to 40 Calculate trailing blanks and don't
      print them.
10050 to 70 Pick up each character from the
      screen.
10080 Send it to the printer with LPRINT.

```

The listing of this routine can be printed as a test. After you have typed in the program, turn on the printer, list the program on the screen and type goto 10000. This is a good way to include operator responses in listings, since RUN, READY and all the other comments will be printed.

```

10000 CLEAR500:DEFINTA,S,B
10010 FORS=15360TO16383STEP64
10020 FORB=S+63TOS+2STEP-1
10030 IPPEEK(B)<>32THEN10050
10040 NEXTB
10050 A$="" :FORA=STOB
10060 A$=A$+CHR$(PEEK(A))
10070 NEXTA
10080 LPRINTA$ 
10090 NEXTS
10100 RETURN

```

by George Blank

BEE WARY

Lao Christoperson



In the immortal (717) words of Muhammad Ali, now Cassius Clay, "Float like a butterfly, sting like a bee." That is the necessary strategy for this new game by Lao Christoperson. Like Android Nim, Life Two, and Snake Eggs, it has both animation and sound.

The game matches a bee, which you control, against a spider controlled by the computer. You use the arrows to move the bee up, down, left, and right, and the space bar to sting. The object is to sting the spider to death before it jumps up and eats you. You can hover at a safe height, but you will get tired and eventually drop down within reach of the spider. It is also not enough to merely sting the spider, as it takes a lucky and well-placed sting to kill it.

The animation sets new standards of quality, even for Lao Christoperson. As the bee moves back and forth across the screen, flapping its wings, it moves so fast that it leaves a luminous trail behind it, while you hear a buzzing sound

from your amplifier. The sound is created by plugging your cassette output jack into an audio amplifier such as Radio Shack's \$10.95 200 mW audio amplifier. When the spider is stung, it goes into a paroxysmal dance of agony in a death scene worthy of the worst ham actor.

It requires luck to win, though skill will improve your percentage. After winning the first round I played, I never again achieved better than a fifty percent kill rate.

The game is fun, and suitable for nearly all ages. My five year old son loves it, while my six year old cannot tolerate the low percentage of success. It is the program I choose to demonstrate my computer to people who have never seen it before, unless I am trying to convince them that it is a serious business tool, in which case I use a text editor.

The game is straight forward and uncomplicated, without a need for complicated instructions or elaborate

strategy. One round only takes a minute or so. This makes it ideal for party use if you post a sign, "No drinks near the computer!" Your guests will have a great time taking turns. The simplicity and brevity of the game does mean that it will not captivate an adult for long periods of time.

Recommendation

Anyone who spends \$1000 for a home computer ought to have a program like this, if for no other reason than to demonstrate what it can do. It is fun, has brilliant graphics, and even has sound. I like all of Lao's games, and I think this is the best of the lot. In one word: Bee-utiful!

Rating's

Instructions:	Very good
Challenge:	Good
Graphics:	Outstanding
Padding:	Very good
Sound:	Fair
Age range:	4 to 114
Recommendation:	Buy it!

Bee Wary is available from BD-US Publishing, P.O. Box 7112, Tacoma, Wa 98407 for \$14.95, first class, post paid.

TRS-80 ASSEMBLY LANGUAGE

Programming - Radio Shack
82-2006 by William Barden, Jr.
\$3.95

Every now and then Radio Shack has a way of surprising you. Their Level 1 Manual, as we all know, was superb. The Editor-Assembler package and their Disk Operating System Manual were outstanding. Now it appears they just may have done it again in a 224 page soft-cover book with the title "TRS-80 Assembly Language Programming".

The author, William Barden Jr. (The Z-80 Microcomputer Handbook, Howard W Sams & Co - 1978 and How to Buy & Use Minicomputers & Microcomputers, Howard W Sams & Co - 1976) has done an excellent job of taking a rather dry technical subject and putting some life into it.

In the book, Mr Barden makes a good case for learning assembly language programming by pointing out the increased speed it provides, and the memory space saved.

Unlike most other books on the subject, this one starts from scratch and assumes you know very little before approaching the subject. In addition, the book covers Z-80 programming from the

TRS-80 point of view, so examples apply directly to YOUR machine.

After looking at the TRS-80 and Z-80 Architecture, he goes into Z-80 Instructions and addressing modes. Although T-BUG is used in most examples, the step from there to using DEBUG or the Editor-Assembler is trivial (and a whole lot easier than T-BUG).

Chapters 6 through 10 are devoted to programming methods, moving data, arithmetic and compare operations, logical, bit and shift operations, string-tables and I/O operations. There are plenty of examples to try, and in fact Mr Barden encourages you to use this book along with the computer.

Appendix I illustrates the Z-80 Instruction Set while Appendix II gives the Z-80 Operation Code Listings. There is a good index.

This one book, if studied carefully, can probably get you from the "novice" class into proficient assembly language programming. You will most likely have fun doing it too. The Z-80 is a remarkable chip, possessing capability most of us were not aware of. Mr Barden tells all about it, and for \$3.95 it has to be one of the better values around today.

It is available at your local Radio Shack.

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More Than One Way

George Blank

Skill in programming consists more of the ability to do a job well than the ability to accomplish a given task. Inexperienced programmers tend to use favorite or familiar commands when another command might be a better way to accomplish the same thing. Quite often there may be many different ways to accomplish the same task.

As an example, when, after two months experience in programming, I wrote the game "Santa Paravia and Fiumaccio" (Available from Instant Software), I needed to prevent the computer from displaying fractional population figures on the screen. It did not seem meaningful to me to know that the city of Fiumaccio had 4092.572 people. The only way I knew to suppress the fractions was using the INT command. Since the population could, and sometimes did, go over 32,767, that presented me with a problem. I eventually wound up with an elaborate routine that looked like this:

```
10 GOTO 100
20 X = INT(X):RETURN
30 X = X/100:X = INT(X):X = X*100:RETURN
40 X = X + (X*RND(7))/100
50 IF X>32767 THEN GOSUB 20 ELSE GOSUB 30
```

I had to test to see if I exceeded the integer limit, divide by one hundred, use the integer function, multiply back by one hundred, and wind up with a population ending in 00 if I exceeded 32767. The whole routine above could be replaced with this one:

```
100 X = FIX(X + (X* RND(7))/100)
```

But that is only one way to solve the problem. Here is a sample program that gives five different ways to eliminate fractions.

```
10 CLS
20 DEFINTI
30 P=3.1415296
40 PS=" "
50 I=P
60 PS=P
70 PRINT"P=";P
80 PRINT"I=";I
90 PRINT"PS=";PS
100 PRINT"INT(P)=";INT(P)
110 PRINT"FIX(P)=";FIX(P)
120 PRINT"P USING PS=";
130 PRINT USING PS;P
```

The five ways are:

- 1 Define integer variables (lines 20, 50, and 110)
- 2 Use the specifier % to indicate an integer variable (lines 50, 120)
- 3 Use the integer function (line 130)
- 4 Use the fix function (line 140)
- 5 Use the print using command (lines 40, 150 and 160)

Under different circumstances, each of these methods might be preferred. Most of the time, method 1 is the most efficient, because it saves memory and leads to faster computation. But it can only be used when you are positive that the number will never exceed 32,767.

Method 2 is handy when you have just a few variables that need to be integer variables, and you want them to be related to other variables using the same letter. For example P might be used in calculating population, then you might use LET P% = P and use P% for display while keeping the accuracy of single precision in P for computation.

Method 3 is handy under the same circumstances as 2, only dropping the fraction at the moment of display, without dedicating an extra variable.

Method 4 is very useful with single precision variables.

Method 5 is the most flexible method shown. By changing your specification string, you can save spaces before your number so that numbers of different size are displayed in the same place (try substituting 40 PS=" ##### " in the sample program), you can round off after the decimal point (substitute 40 PS=" .###") or even add a format (substitute 40 PS=" \$ ##.##/100THS DOLLARS").

Even these 5 methods do not exhaust the possibilities. You will notice that I do not include the clumsy subroutine mentioned earlier. There are probably many circumstances in which a method given here might not be the best way.

One of the best ways to grow in your programming skills is to look through your reference materials in your spare time, pick out a command that you are relatively unfamiliar with, and study and use it until you know it well. If this becomes a habit, your skill will develop rapidly. Programmers do it in different ways!

Rod Hallen

I am a free-lance writer and I specialize in personal computing. A couple of years ago I selected the S-100 bus as my personal microcomputer standard and my present Z-2 mainframe is built around that standard. More recently, when I saw how popular the Radio Shack TRS-80 was becoming, I decided to buy a 16K Level II machine so that I could slant my writing towards the largest possible audience.

This quickly presented me with a dilemma however. My big machine supports CP/M, 2 full size disk drives, a high speed line printer, 64K of static RAM, and many other peripherals. If I were to add similar items to the TRS-80, I would be duplicating my already large investment and because of the specialized nature of the TRS-80 bus, many of the items that I am interested in are just not available for mating with the TRS-80.

When I saw the first advertisement for the HUH Electronics 8100 TRS-80 to S-100 Adapter/motherboard, I immediately wrote for one. See Table 1. Theoretically, I would then be able to use any of my 13 S-100 boards with my TRS-80. It didn't turn out to be quite that simple, as we shall see, but the results were still very much worthwhile.

The 8100 is available in either kit or factory assembled and tested form. Ralph Garetz, the President of HUH assures me that every factory assembled board is tested 100% before he will ship it out. I haven't had any problems with my 8100 at all.

I got the assembled version but the kit instructions are clear, very straightforward, and shouldn't present any problems, even to the novice builder. The manual even contains a short course on installing the various components. A definite plus is the inclusion of sockets for all ICs. Nothing is less exciting than trying to remove a defective IC or one that has been installed backwards. In fact, it is easier to find a defective IC by the substitution method if they are socketed.

After I had used the 8100 for a while, HUH came out with the Mini 8100 and it appeared that it was even better suited to my needs. I obtained one of these and put it to the test also. I am now using the Mini but I'll let you decide for yourself from the following evaluation, which one best fits your requirements.

The Maxi-8100

The big (14 X 17 inches) 8100 board performs three different functions. The basic function is the TRS-80 to S-100 Adapter/motherboard. This takes the TRS-80 bus signals and buffers, modifies, or otherwise adapts them to the

requirements of the S-100 bus. The signals thus produced are not a perfect representation of the S-100 bus but they are satisfactory in most cases. I'll go into the compatibility situation in a few moments. One S-100 socket is provided and 5 more can be added as an option.

Also available is the RAM Support option. This provides sockets and support for up to 16K of RAM. The memory ICs are not included with this option but they can be purchased from various vendors. I have seen them advertised for as low as \$53 a set. This is certainly an inexpensive way to increase the total memory in your machine. You can also use the 4K chips that you took out of your keyboard unit when you upgraded it to 16K.

The I/O option consists of a parallel and a serial port. The parallel port is a latched bi-directional 8 bit port with input and output handshaking.

The serial port can be configured for either RS-232 or 20 ma operation with a software programmable baud rate of from 50 to 56K. It can also be strapped so that your TRS-80 looks like a computer to its peripherals or like a terminal to a larger computer. A standard RS-232 DB-25 type connector is mounted on the board and software patches are provided so that you can drive a serial printer with the Level II LLIST and LPRINT statements.

All versions of the 8100 come with a 40 conductor ribbon cable which plugs into the expansion port on the back of the keyboard unit. In addition to the connectors provided on the board for the I/O ports, there is a TRS-80 expansion bus connector and one to extend the S-100 bus. The TRS-80 bus connector could be used to feed the Expansion Interface. The S-100 extender could be used to fit in a Godbout or Vector motherboard for even more S-100 slots.

Power for the 8100 must be provided from an external supply. The requirements are +5 volts at 1 amp., +12 volts at 500 mA, and -12 volts at 500 mA. This will satisfy the needs of the 8100 but to this you will have to add the requirements of the S-100 boards that are plugged into it.

Prices for the basic board and the options mentioned above can be found in Table 1. Note the considerable savings possible by buying the entire package at one time.

The Mini-8100

The Mini-8100 contains only the TRS-80 to S-100 adapter/motherboard portion of its big brother. If you don't need the RAM Support or I/O options of the MAXI, then this is the one for you. The price is considerably lower and it is also much smaller.

The Mini is available in two versions. The standard board mounts 4 S-100

8100 AND MINI 8100 TRS-80 TO S-100 ADAPTERS

sockets. It is electrically identical to the adapter section of the MAXI and it requires the same external power supply. I am using a homebrew supply left over from who knows what.

The Mini-8100 is even smaller yet! This is designed to plug into an S-100 socket. Remove the CPU board from your mainframe, plug in the 8100S and connect its cable to your TRS-80 keyboard unit. No external power supply is necessary to use the 8100S since it derives its power from the S-100 bus that it is plugged into.

You should now have access to everything installed in the mainframe subject to the limitations we'll discuss further on down the page. I'm working on a scheme that will allow the Z-2 CPU board to remain in place and then I'll be able to run both computers at the same time in a multi-processing configuration.

In the meantime, I've tried the Z-2 and the TRS-80 together with back-to-back RS-232 ports. This lets me write programs on the TRS-80, store them on the 8" CP/M disks, and dump them to the Malibu 160 line printer. I can also edit the programs using my Microsoft Disk BASIC since it is very similar to Level II.

S-100 Compatibility

The following comments on S-100 compatibility apply to all versions of the 8100.

There are two limitations on the use of the S-100 boards with the TRS-80. No DMA (Direct Memory Access) operations are allowed and S-100 boards that stall the processor for more than 1 millisecond are taboo. These are a constraint of the TRS-80 and not the 8100. They are a result of the refresh requirements of the Dynamic Memory ICs. Stop the processor for much more than a millisecond and the memory chips will go blank.

I have a large number of S-100 cards and I tried them all. First came 3 different 16K static RAM boards. Each of these worked perfectly and, although these boards are more expensive than TRS-80 or 8100 16K expansion, they are a cheap way to gain more memory if you already have them at hand.

The MicroSounder and the Percom CI-812 Cassette-RS-232 boards also performed without any difficulties. The Music System by Software Technology will not work because it utilizes the "PINT" lead (5 = 100 pin 26) which is not implemented on the 8100. It should be possible to rewrite "Music" to use one bit of a parallel port or the output handshaking lead.

My Cromemco D+7 Analog/Digital Interface board seemed dead until I realized that it was not responding to its port addresses. This was because the "PHLDA" lead (5-100 pin 26) was also not implemented. Grounding pin 26 took care of this problem.

My four-line parallel I/O board works great with the 8100 also. In fact, all memory and I/O boards seem to be compatible. HUH claims that my DISCUS disk controller board will also work with the TRS-80 but that it is necessary to disable the Level II ROM because it resides in the same memory space that CPSM uses. There are rumors of a full size disk version of CPSM that will be compatible with the TRS-80. I'm looking forward to it.

HUH suggest that you try out any S-100 board that you want to use with the TRS-80 - 8100 combination before you buy it. This is sound advice.

Conclusion

The only reservation that I have about the 8100 is the lack of an enclosure. The board and its electronics are completely exposed and they could be easily damaged mechanically or electrically. There is supposed to be a ready-made enclosure available from another vendor in the near future. In the meantime, any form of covering that you can dream up would help protect your investment.

I definitely feel that the various revisions of the 8100 are good buys. The hardware quality is very good, the manual is outstanding, and the reliability that comes to the S-100 bus gives you a worth the price.

Table 1

MAXI-8100

ASSM & TESTED	KIT	ITEM
\$245	\$185	Basic board
75	45	RAM option
115	85	I/O option
75	45	5-conn & guides
\$510	\$360	If bought separately
\$375	\$295	If bought together

MINI-8100

ASSM & TESTED	KIT	ITEM
\$155	\$115	MINI-8100
125	95	MINI-8100S

Available from computer stores or direct from:

HUH Electronics
1419 Maple St.
San Mateo, CA 94402
(415) 573-7359

NEW PRODUCTS (contd from Page 13)

SoftSkill Unlimited, PO Box 145, Lithonia, Georgia 30054 has announced an accounting system for TRS-80 disk systems. For information on this and a host of other applications programs, write them at the above address.

THE BOTTOM SHELF Inc has introduced THE BASIC TOOLKIT, a programmer's solution. The Basic Toolkit is a machine language program which will search a basic program and print out to screen or printer, an alphabetized listing of the variables used in the program and the line numbers in which they are found. Or, search and print a listing of all GOTOS and GOSUBs and the line numbers in which they appear. Or, restore basic programs that have been accidentally lost. Or, check for bad memory in 15 seconds! It will also Merge programs on a cassette based system or search memory for all occurrences of a specific byte and list the locations where it occurred. The Bottom Shelf, Inc PO Box 40104, Atlanta, Georgia 30359

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CALBOOKTRON, Box 5, Hawthorne, CA 90250 distributes calculators and a book called "HOW TO SELECT AND USE A CALCULATOR" by P. R. Jacobs. The book contains many formulas or algorithms for solution of problems on 4-function calculators which can easily be adapted to computers. The book is available by mail for \$2.25 plus 65 cents postage.

HARDWARE REVIEWS

INCREASE TRS-80 OPERATING SPEED

Rod Hailey

I have seen a number of modifications to the TRS-80 that were intended to increase the clock frequency and thereby increase the operating speed. However, all of these mods had one thing in common; changing speeds usually destroyed any program in memory at the time. And then along came Bill Archbold with a speedup board that allows you to change from fast to slow and back again whenever you like.

The best part of Bill's circuit is the fact that speed changes are handled in software. Your TRS-80 always comes up in normal speed when it is turned on. An OUT 254.1 will shoot to high speed at anytime and an OUT 254.0 will return the machine to normal. These can be given as direct commands or they can be incorporated into programs.

How fast is high speed? The normal TRS-80 clock runs at 1.77 MHz. The Archbold board increases this to 2.68 MHz for a gain of 50%. With many programs the change will hardly be noticeable because things happen so quickly anyway. But if a program incorporates a lot of calculations and you find yourself sitting and waiting for the machine then this mod is for you. A 50% increase in machine speed means that a program which used to run in 6 minutes will now run in 4.

Installation

Wiring the speedup board into your TRS-80 couldn't be simpler as long as you have a nodding acquaintance with a soldering iron. The board, which contains 4 ICs, comes assembled and all that you have to do is run 8 wires to the Main processor board, add one jumper, and cut one trace. My total time was under an hour.

I could have cut that time in half if I hadn't made a mistake. The connections to the main processor board are made on the solder side while all of the component identification is on the opposite side. I got one wire off by a row and spent a half hour troubleshooting. If you decide to install this board, double check your position on the board before soldering each connection.

The trace that needs to be cut is located under the Level II ROM board. After I pulled off the double-sided tape that holds it in place, I discovered that I could have cut the trace on the component side of the board although this would have made it a little more difficult to terminate the CLK lead. If you're in

doubt about this, then follow the instructions exactly.

Application

As intended, the operating speed of any and all programs was increased by 50% but what about cassette operations? Is it possible to CSAVE while in the high speed mode and create 750 baud tapes? Yes it is! Programs can be CLOADed at normal speed and then dumped at high speed. They must, of course, be CLOADed at high speed from then on.

While experimenting with this type of operation I found it necessary to adjust the recorder volume control slightly but other than that playback was the same as before. If you monitor the recording process, you'll note the higher frequency of the data on tape. You'll also appreciate the shorter loading and dumping times.

I tried to run my disk at high speed with mixed results. It would work this way but the reliability was about equal to that of my cassette conversion factors. I added playback automatic level control to my CTR-41. If it's too bad it doesn't matter because you can just reformat to switch to either speed interchangeably. The disk is fast enough already so this isn't really necessary but if you're like me, you'll forget from time to time to save the machine before you initiate disk operations.

I don't have a printer connected to my TRS-80 anymore but since the printer is the one that decides when the next character will be sent, latency should not affect hardcopy conversion. I do have a homebrew RS-232 interface running at 2400 baud that sends TRS-80 programs to my Cromemco Z-8 for storage and hardcopy printing. It works the same in either mode.

An Alternative

If you have already made a speedup mod such as the one described in TRS-80 Computing, Vol. 1, No. 2, and find that it is necessary to shut off the machine in order to switch speeds, you can still generate 750 baud tapes with J. Dolmetsch, 7825 Willowcrest Way, San Jose, CA 95125 has written an assembly language program called "MINTTAP" which he sells for \$25. "MINTTAP" loads BASIC or SYSTEM tapes at 500 baud and then dumps them at 750 baud. All of this is while the TRS-80 is running

at normal speed. You can then switch speeds and read the faster tapes.

While this program isn't necessary if you are using the Archbold board, I did create some 750 baud tapes with it for testing purposes. I then read them at high speed without any problems which proves that it puts the proper data signals on the tape.

Conclusions

Bill Archbold, whose address is 106 Sycamore Drive, Marine AFB, CA 95455, sells his speedup board for \$24.95 which includes shipping and handling. I think that this is a worthwhile modification for the TRS-80 and it is the first one that I have installed in mine since I bought it six months ago. Being able to switch speeds at will without having the TRS-80 hang up is worth the time and money. Now that I have broken the seal, I'm going to explore other mods. If you're particularly interested in speedups,

TRS-80 PRINT MODULE

Rod Hailey

There isn't too much that you can say about a product that is so simple and foolproof to use as American Micro Products' TRS-80 Print Module. The module is intended to drive a Radio Shack iComtronics 779 line printer directly from the Expansion Bus connector on the rear of the keyboard unit thereby eliminating the need for the Expansion interface.

Documentation includes installation instructions, Theory of Operation, schematics, and Cable Computer/Terminal Installation. Installation is as easy as plugging the Module into the keyboard and the included 8 foot cable into the printer which will then respond to the BASIC LPRINT and LPRINT commands. It is possible to plug the module in upside down and since I have more than one peripheral that I connect to the TRS-80 I marked "TOP" in large white letters on the appropriate side of the Module to preclude any mistakes.

If you want the printer capability but don't have need of the other features of the Expansion Interface, the AMP Print Module can save you \$20. It is available from American Micro Products, Inc., 6000 Farnell, Houston, TX 77074 for \$99.95.

TAIPAN

This is a very difficult game to review in order to review it...you have to play it. And once you start playing it, you don't want to stop to write a review! I have spent about twenty hours playing Taipan, and I still like it more than any of the other single player games in my files, out of more than 100 games.

You begin the game in Hong Kong in the year 1860 with a small boat and a little working capital. Unfortunately, you had to borrow the money for the boat from a Chinese loan shark who charges 10% monthly interest. That is only the beginning of your problems. As you carry cargo from port to port in the China Sea, your biggest worry is pirates. The biggest pirate of all is Li Yuan, whose fleet may attack with over 100 ships at once—hopeless odds. A smart trader pays tribute to Li Yuan but even that does not make you completely safe, even from him. And there are lots of other pirates, often with good sized fleets of their own. In addition to the pirates, you have to worry about sinking in a storm.

If you manage to avoid, run away from, or fight off the pirates, you hope to get enough money trading cheap general cargo and running guns to be able to deal in the silk trade, and sooner or later pay off the moneylender before his bill gets astronomical. But even the silk trade is only a way station in your dreams. The big money is in opium trading! Of course, opium trading is risky and illegal, and you have to worry about the port authorities as well as the pirates. As if that were not enough hazards, there are also robbers in every port who would like to acquire your bankroll. The only relatively safe place to keep assets is in Hong Kong, where you have your warehouse and your bank account.

Your warehouse and bank account also allow you to earn some easy money, as the bank pays 6% monthly interest, and you can use the warehouse to speculate in Hong Kong commodities. If you tire of such safe investments, and even shipping opium is dull for you, you also have the opportunity to equip your ship with guns and do a little pirating yourself. If, instead of running away when you are attacked by pirates, you stand and fight, and if you actually win, then you get your loot. Unfortunately, it is very noisy, and really doesn't pay well.

From time to time, as you are in port, you will be offered a chance to trade in your ship on a larger one. That means that you can carry more cargo and make bigger profits. It also means that the pirates become more interested in you.

The object of the game is to become a

millionaire, and if you have over \$1 million in cash on hand and in the bank when you arrive in Hong Kong, you win. There is also a scoring routine that scores you on how fast you made your money and how much over a million you made. The score can be as low as 300 or go over 100000, so there is still a challenge after you become good at it.

Most of the game is played with a display chart that shows the goods you have in the warehouse and on ship, how much you have in the bank and how much you owe the moneylender, how many guns you have and how much free cargo space you have in your hold. While there is nothing visually exciting about the chart, the information is well organized.

The only graphics routine occurs when you are attacked by pirates. Their junks are displayed on the screen, and when you hit one, it flashes, shakes, and shows holes in the sails and hull. If your hit is a good one, you watch it sink. If there are still ships left, the next sight is not so pleasant—you see their guns flashing, and if their aim is good, the whole screen shakes as you are hit. The routine is well done and fun to watch.

I feel the game has only a couple of minor flaws. The main one for me is that it is for only one player, and I would much rather play a game with a friend than alone against the computer. Of course, I will admit that often there is no friend available, and that is when I personally play Taipan.

The other flaw is the lack of more graphics routines. The pirate ships are so well done that they leave you hungry for more clever graphics. Unfortunately, there is not much room left in the program, as it almost fills a 16K Level II TRS-80.

The game comes with two programs on one tape. The first one contains the instructions, which are clear and interesting, but not terribly exciting, and the other program is the game itself. The programmer is Art Centil of San Francisco.

My Ratings:

Instructions:	Good
Challenge:	Good
Graphics:	Outstanding
Pacing:	Excellent
Recommendation:	Buy it! One of the best single player games.

Taipan is available from the TRS-80 Software Exchange, 17 Baker Cliff Dr., Milford N.H. 03066 for \$9.95 plus \$1 per order shipping.

GRAPHICS AT 32 characters line

Peter A. Lewis

Have you ever tried to use graphics in Level-II with the screen set at 32 characters per line? When I tried it, I got quite a shock! As you may know, a particular area of memory is assigned to the video display. That area is 3C00H to 3FFFH. In normal mode, any data placed in one of these locations will be automatically displayed on the screen. No IO instructions are necessary. When you issue a SET(0,0), for example, BASIC places an ASCII 129 at location 3C00H. (Assuming no other points are set in that byte) In large letter mode, however, only the even numbered bytes will display on the screen. (3C00H, 3C02H, etc.) The odd numbered bytes are ignored. Since each byte contains 2 pixels in the horizontal direction, a SET(0,0) or SET(1,0) will work fine, but a SET(2,0) or SET(3,0) will be ignored. SET(4,0) will light the next pixel.

Now, suppose you are in large letter format and you want to draw a horizontal line from pixel 0 to 10 across the top of the screen. Going from (0,0) to (10,0) will not work, since you will only get 6 pixels lit instead of 11. You could just go from (0,0) to (20,0) incrementing by 1 in a FOR..NEXT loop, but this would draw the line at half speed. A more interesting result appears when you try to draw a diagonal line. Try this:

```
100 PRINT CHR$(23)
110 FOR N = 0 TO 20
120 SET(N,N)
130 NEXT N
```

Looks kind of strange, doesn't it? So what is a good way to correct this? Incrementing the second operand of SET is fine, but the first one must be incremented by 1, then 3, then 5, etc. This could require some awkward programming, especially if a lot of lines had to be drawn at various locations. Isn't there some formula that will automatically convert an X-coordinate to its proper value in large-letter format? Yes! Modify the above program like this:

```
100 PRINT CHR$(23)
110 FOR N = 0 TO 20
115 X = N + 2^INT(N/2)
120 SET(X,N)
130 NEXT N
```

Now any N will be converted to the proper X to light up the desired pixel.

Have fun drawing those large graphics. They look great!

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MAR-APR 79 Vol II #2

MAY-JUN 79 VOL II #3

JUL-AUG 79 Vol II #4

They are available for \$3.00 per copy.

DOS 2.2 and ANIMATED GRAPHICS

We received DOS 2.2 and have found that it uses the "NAME" command. This causes havoc with some of our software (ANDROID NIM SNAKE EGGS, LIPETWO and BEEWARY). These all run fine with NEWDOS or DOS 2.0/2.1 or in 16K level II.

TRS-80 MODEL II

We have a 64K Model II on order and will cover it in the JOURNAL on a percentage basis. That is, if 10% of all TRS-80's are Mod II we will devote 10% space to it. Actually, for some of the applications here at 80-US, the small disks are no longer adequate. Our subscriber list is spread over 13 disks now (no, they are not all full, yet!).

WORLD POWER

You don't really want to hear any more about that mess, do you?

UPCOMING -

Watch for some real advances in game programs from The TRS-80 Software Exchange. We will also introduce at least two new SOUND with ANIMATION games in November. AND, since we have expanded our Journal, look for complete listings of some very interesting educational programs in future issues.

If you don't enjoy what you are doing, you are not doing it right!!

Mike



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